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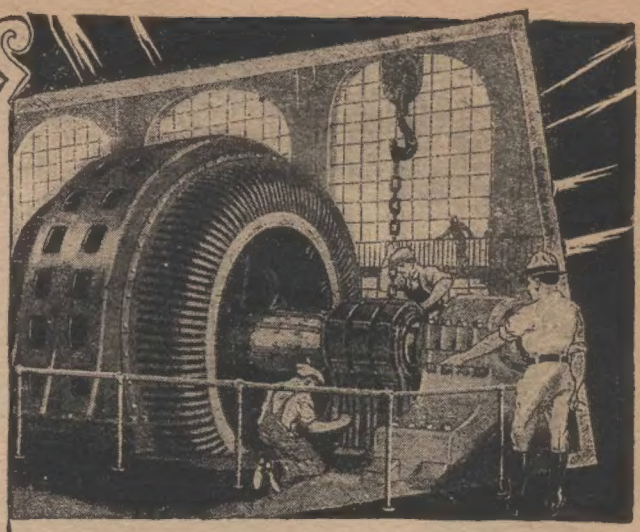

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VOLUME 4

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Extravagant Fiction Today - - - - - - - - - Cold Fact Tomorrow

Acceleration in Interplanetary Travel

By T. O'Conor Sloane, Ph.D.

WE find ourselves in a peculiar dilemma in reference to one class of stories for which so many of our readers have expressed a preference. These stories fall into the class of Interplanetary Travel and the dilemma is in this: AMAZING STORIES is devoted to stories involving the many phases of natural science. Of course, the word science means everything that is known. It definitely means knowledge, and it is not too much to say that the commonest actions of our lives, if the mind has any part in them, are scientific. But this is to a certain extent begging the question, for what is usually meant by science, and certainly what the readers of this magazine understand by that word, is what is known as Natural Science, which can be extended to include ethnology, or the study of the races of men, and philology or the study of languages, and many other such topics. The effect of this is to give an extended range to the subjects presented to our readers.

But to come back to interplanetary travel. If voyages were to be made from the earth to any of the planets, or even to the moon, the distances are so great that starting from rest as the travelers would do, they would have to attain a high velocity in a very short space of time. Such a change of velocity, if in the direction of speed, is called positive acceleration, or more often simply, acceleration. If velocity is checked and reduced, the process is called negative acceleration. If a person were to enter an elevator and it rushed down its shaft with evenly increasing speed, so that at the end of a second it would be moving at the rate of thirty-two feet per second, and at the end of the next second at sixty-four feet a second, the weight of this person in the elevator would disappear as far as the elevator is concerned. If he jumped up in the air, he would strike his head against the top of the elevator and would stay there. If there were a spring balance in the elevator and the person were to stand upon it, instead of showing his normal weight, which might be 150 lbs., it would show simply nothing. But suppose that he started at the foot of the shaft and stood upon the spring balance: the instant the elevator began to move upward he would show more than his normal weight, which would continue to show on the dial as long as the car increased its rate of motion. Once the rate of motion ceased to increase, his normal weight would show.

The point to be made is that weight is entirely dependent upon gravitation—that weight has nothing to do with acceleration, but at the same time the effect of weight may be produced thereby. One of the great feats of baseball players—cited many times—is the catching of a ball thrown from the top of the Washington Monument, which gives a fall of about 550 feet. This, of course, brings it down very rapidly and when the catcher receives the ball on his glove, it will probably feel as though a 10-pound weight landed there. Of course that would only be true for a fraction of a second.

In interplanetary travel, where the travelers start from the earth at a velocity of zero, that is to say from rest, the acceleration must start and must be very rapid, so that the travelers will press, not with weight alone, but with a combination of weight and the force of positive acceleration against the base of the chamber in the projectile, or "ship," as it may be termed. Now this pressure will be so enormous that, in order to reach a planet, or even to reach the moon in any reasonable time, it would probably be sufficient to kill the person, just as he would be killed by a fall—let us say, for instance, from the Washington Monument. On striking the earth, he would be killed by negative acceleration.

One of the ideas in interplanetary travel is to use a rocket-propelled vehicle—that is, a vehicle from whose stern gases will be propelled at high velocity by some explosive mixture. This is the way in which a rocket rises upon its impressive flight into the upper air.

Now some of our readers do not understand how a rocket could work in a vacuum, where there is no air for the expelled gases to press against. Here again there is a bit of science to be learned. The rocket acts by pure reaction—the presence or absence of air has nothing to do with its propulsion. Action and reaction are equal and opposite. If one fires a gun, one feels the recoil against the shoulder, if this gun is fired in the air. If by some means you could be transported with it to a vacuum and fire it there, the pressure against the shoulder would be practically identical with the first. The air has nothing to do with the motion of a rocket and nothing to do with the recoil of a gun except to act as a retarding force. Action and reaction are equal and opposite, independent of the surrounding of the body with air.

So since our readers like interplanctary stories, since they unceasingly ask for them in letters to us, and since there is any amount of science, mechanical, astronomical and other to be gleaned therefrom, we certainly shall be glad to continue to give them, even in face of the fact that we are inclined to think that interplanetary travel may never be attained. On the other hand, in science, "never" has proved to be a very dangerous word to employ.

So many "impossible" things have become almost common occurrences. Much of what we have said above may apply to the fourth dimension, which is almost undefinable in popular terms, yet our readers like it. It does give a basis for good, scientific stories, and we see no reason why even an apparent impossibility should not be invoked for the sake of a good story. Some people have been carried away by the idea of the fourth dimension, much as others have been carried away by spiritualism. Some very curious books have been brought to the attention of the writer treating of the fourth dimension, but we will take it for what it is worth—as a mathematical construction and conception—and it will serve as a fine basis for stories of science and will bring out very good scientific points.

Microcosmic Buccaneers

THE conception of planetary atoms is not a particularly new one to most of our readers. But it is remarkable what can be done with this theory by an author who, in addition to being endowed with a fertile imagination and the gift of facile expression, is also a man of science. Mr. Vincent does full justice to himself as a writer and to the possibilities contained in this idea. He gives us a plausible story, chock full of good science, and as good a piece of scientific fiction as you have ever read. We know you will enjoy it.

By
Harl Vincent

Author of "Barton's Island," "The War of the Planets," etc.

Illustrated by MOREY

An Astounding Discovery

IT was utterly incomprehensible, yet it was true. They had seen it with their own eyes. Young Grayson R36B stared at his father's friend with amazement written large on his lean, bronze countenance. Minott V8CA, Director of Physical Research of the eighth Terrestrial district, returned the stare with something of awe in his tired gray eyes.

"Grayson, my boy," he said, "we have succeeded beyond my most optimistic hopes. We have delved into the secrets of the microcosmos. We have located one of its innumerable universes and have there found an inconceivably minute world with its own sun, moon and stars, and peopled by living, thinking creatures who resemble the white race of our earth in physical appearance. It is quite unthinkable, but here is the evidence."

He glanced again into the eyepiece of the massive instrument before which they stood.

"I still can not understand it," remarked the younger man, slowly and with a perplexed frown. "Of course I am as yet ignorant of all excepting the mere rudiments of science. But it seems to me I have read, or perhaps you told me, that these electrons, of which our infinitesimal world is one, are traveling at great speed even in matter of considerable density. How, then, can your super-microscope view these objects as if they were stationary?"

"That is a feature I neglected to mention. The initial magnification, as I believe I told you, is accomplished by a powerful ray of vibrations. This ray impinges on the object to be viewed and is the first stage of magnification in the system which gives us such enormous powers. The ray, in addition to giving us the first ten thousand diameters, has the property of following the motions of which you speak. Its far end oscillates in exact harmony with the motions of molecule or atom or electron as the case may be, while the source of the ray remains stationary and thus impresses a stationary image on the object reflector to the second stage of the instrument."

Grayson R36B nodded in comprehension, though he was unable to picture in his mind's eye such movements of a ray so small as to be unmeasurable and, in fact, invisible in a high power miscroscope of standard type. This was but one of the many things he had yet to learn. But he found the mysteries of science intensely interesting as propounded by his mentor, and he looked forward happily to many years of such association with the great man into whose care he had been legally placed at the death of his father, two years ago.

"What is the next step?" he asked.

Minott V8CA pondered the question. He had been wondering over the same subject. He was not satisfied with knowing as little as they had been able to see of the inhabitants of the tiny world now visible in the eyepiece of his instrument. He wanted to view them from still closer, to learn more of their lives and of their history. He replied, half jesting, "I should like to pay them a visit."

"Pay them a visit? But that is impossible."

"Nothing is impossible. We are living in the thirty-third century, my boy. Fifteen centuries ago it was

¶ They obeyed in some little trepidation, drawing near the strange conveyance and stopping as a small square opening appeared in the side nearest them

thought impossible that man would ever fly—mind you, fly in the atmosphere like a bird. Ten centuries ago it was thought that gravity could never be counteracted or overcome. And less than five centuries ago a trip to one of the planets was held to be the height of ridiculous imagination. Yet all of these things have been accomplished, and much more. No, I would not say the trip is impossible."

"But it is hardly probable, is it?"

"Hardly. Though the thing merits consideration."

The great scientist mused further. His young protégé let his mind dwell upon the bizarre possibility suggested by the older man. There was no more adventure in the world, he ruminated. Some of the ancient sound films, that had been used as a part of his education, portrayed stirring events of the distant past. Adventures had been commonplace in those heroic days—ocean flights in tiny, wind-buffeted vessels that looked as though they would never weather the storms—struggles of man against the wilderness, building huge dams across turbulent rivers or erecting strange steel towers, that carried power lines through well-nigh impenetrable jungles. Wars and rebellions in remote provinces had likewise appealed to him. But in his own day there was none of that, none of the excitement that had been the lot of adventurous youth in the dark ages. There were no storms now to buffet the gigantic air liners crossing the oceans, for science had conquered the weather. There was no wilderness nor jungle. Nor were there remote provinces, where battles might be fought and deeds of valor might be performed. The world was entirely civilized and overpopulated. Several generations back it had been considered somewhat of an adventure to make a trip to Mars or to Venus, but even this no longer provided excitement, for these planets were now but a few hours away and were so like earth in civilization and appearance as to present no novelty for a visiting terrestrial. Now here was a new possibility in the microcosmos—and who knew how many more of the tiny worlds might be inhabited? But he could not bring himself to seriously consider the probability of ever reaching one of them.

"Grayson," spoke the older man, interrupting his line of thought, "I intend to do some heavy thinking over this thing. You know the control of our physical size is a comparatively simple matter now, within limits. Of course we have standardized on six feet three inches as man's stature and five feet eleven as woman's, but there is no reason this might not be altered greatly if desired. By the use of one of the hormones of the pituitary gland we might grow giants of eight feet stature and by causing certain endocrine deficiencies it is possible to dwarf a man to a fourth of normal height. By similar processes it might be that we could contrive to reduce ourselves to the dimensions necessary for life on our newly found electron world."

"You really think something might be done?"

"Might be is the proper term. It is far from being a simple matter. But, as I said before, I shall think about it seriously."

"Supposing it were possible to reduce our bodies to the proper size. We should then be the distance of many universes from that grain of sand which contains our Lilliputian world. We might as well be at the outermost edge of our own galactic * universe. How would we ever reach it?"

"That is probably the most difficult part of the problem, and the one requiring the most thought. But it must be susceptible to solution, if not in our lifetime at least at some future date."

Grayson's delight at the words of his guardian was evident in his eyes and it abated but little at the further warning that all this talk of visiting the populated electron was extremely fanciful. And that night he dreamed of green forests and of running streams and of all those things that had existed for him only in history and in carefully preserved picturings. For Grayson R36B was not yet twenty-five years of age.

By Means of the Fourth Dimension

WITH the passing of four months the scientist found himself little closer to the solution of the problem than when it was first presented. Experiments with white mice as subjects had progressed to the point where these lively creatures had been reduced to the size of blood corpuscles, a dozen or more of them scampering about in an opening the size of a pin point indented in a thin paraffin coating on a microscope slide. They were still far from their goal and the young man, who had assisted with all the work, was on the point of despairing entirely.

Then there came a day when Grayson R36B was startled from his observation of the electron world through the super-microscope, by an ecstatic shout from his guardian.

"What is it?" he asked excitedly.

"We've been working on an entirely wrong basis, Grayson. But now I see the light. The fourth dimension!"

"Fourth dimension?" repeated his ward, blankly.

"Certainly. I don't know why I haven't thought of it before. We'll visit the tiny planet by its agency."

"But—but I thought the fourth dimension was only a mathematical conception—that there was no real knowledge of it."

"You are quite right, my boy, as far as any published data is concerned. But there have been experiments—successful ones too—that were apparently of no practical use. Now we have the practical use. You understand, of course, that even though you do not perceive a fourth dimension, all objects in our universe must be possessed of this abstruse quality in order to exist. We live and breathe in a four-dimensional world that is part of a four-dimensional universe. The so-called dimension has been variously explained but for our purpose we need not enter into any of the various arguments which have been brought up. It is not time in the strict sense that we are interested in, but the the time-space relationship, and it is that relationship I intend to employ in entering that little world at which you have been gazing."

"You mean, if the time-space relationship as applied to our physical existence is altered, we shall then have no difficulty in making the journey?"

"That is it exactly, my boy. We as human beings are four-dimensional entities peculiarly adapted to life in our own environment. These entities occupy space in a definite volume we are pleased to designate by three dimensions. But the interval, the time-space relationship, is what makes us as we are. Size is only relative and if everything in the universe were suddenly to become a million times larger or a million times smaller, we should not be aware of the difference for our standards of measurement would also have altered in like proportion."

"But how to effect such a change?"

"I'm coming to that. There is a plane which in 3281 was designated by Rollin D4Y as the hyperphysical plane. And Rollin experimented at considerable length in rotating objects in and out of this plane by various methods. In the most successful of the methods used, a purely mechanical means, he found it possible to rotate living creatures instantaneously into and out of the

* Galactic indicates the milky way as the location of a cosmic or astronomical system. It means "milky" (from the Greek).

hyperphysical existence without harm. By instantaneous, I mean that the transition must take place within the period of not more than two or three heart-beats of the subject. We shall go further than did Rollin. We shall not only enter the hyperphysical plane, but shall project ourselves into the delectable world of the microcosmos and there emerge as entities adaptable to the greatly different existence."

Grayson's eyes popped. "You think it can be done?" he gasped.

"I'm sure of it. And quite simply too."

Minott hurried to a large cupboard at the side of the laboratory and there brought to view a dust-covered apparatus that Grayson had never seen. This was provided with a box-like base set on four casters and it was trundled forth by the excited scientist.

"A duplicate of Rollin's apparatus," he explained, busying himself with a duster.

GRAYSON watched in intense interest as the older man uncovered the upper portion of the mechanism. There was a huge vacuum tube, one of the largest he had ever seen, and about this there clustered a maze of helices of tiny silver ribbon. Two arms swung out from the side of the box, and each of these carried what appeared to be a parabolic reflector, also of silver. There was a heavy cable to which a wall plug was attached, and Minott connected this with a base receptacle nearby. He withdrew a slide from the side of the box and arranged the two reflectors to focus on the slide. Then he reached for one of the small cages containing a normal white mouse and this he placed on the slide. With all arranged to his satisfaction, he pulled a switch at the side of the mechanism. There came a roar from within and the great vacuum tube lighted to a dull red glow. The mouse scampered unconcerned in its cage.

"Now, observe closely," said Minott, placing his finger on a small button that Grayson had not noticed.

He pressed the button and the universe seemed to totter. The very space about them seemed to warp and twist. The lively creature in the little cage vanished as suddenly and utterly as if a genie had whisked it away. Grayson stared dumbfounded. A second passed. Two seconds. Then, in a puff of blue haze, the mouse once more nosed about in its coop. The accompanying wrench of the space in which they stood left Grayson trembling and aghast.

"Good grief!" he exclaimed. "There's strong medicine in that box all right! So that's the way we are going?"

Yes. Excepting we must combine Rollin's apparatus with my super-microscope."

"Combine it?"

"Of course. Otherwise we should not reach our destination; we would merely return to our normal existence, as did our little subject. With our existence transferred to the hyperphysical plane, we'll be whisked along the minute ray of the super-microscope, which is now trained on the place we are to visit. In reentering the purely physical plane, our time-space relationship must necessarily alter in exact accordance with the requirements of the microcosmos."

"And the return? Getting back to our own world, I mean."

Minott was already busy with the connections between the two mechanisms. He did not look up from his work as he replied, "Oh, for the initial visit I shall set a time switch to control our apparatus here. We'll stay but two minutes and then return in the same manner. After the first trip, a better method can be worked out. But in any event it is merely a reversal of the original process. Are you ready?"

He looked at the younger man with a twinkle in his eye.

"Now? Right away, you mean?"

"Yes. All is prepared."

"Why sure, I'm ready if you are."

"Very well, then. We'll be off at once."

He made the final adjustments to the apparatus, directing the reflectors of the Rollin mechanism to include a tiny disc he had attached to the super-microscope. Grayson was somewhat apprehensive as he watched the attaching and setting of the time switch, but he had no thought of reconsidering or of objecting.

"All right, Gray," came in measured tones, as the scientist straightened from the completion of his task.

He drew the younger man into the proper position before the apparatus and threw an arm affectionately over his shoulder as he reached forth with his free hand to close the main switch and press the button. This time it seemed to Grayson that the very fibres of his being were wrenched asunder. There was a terrific flash of blinding light, an inconceivably violent explosion, and then a momentary impression of being hurled through the vastness of space. He opened his eyes to the glare of sunlight and instinctively ducked his head at sight of a heavy object rushing to meet him. There was a sickening thud and his senses left him completely.

A Fatal Error

WHEN Grayson R36B recovered consciousness it was slowly and with tortuous, futile attempts at raising himself to a seated position. He lay prone in some feathery, aromatic substance that was soft as down, but of so great a depth as to almost bury his body. His head ached abominably and his lids refused to open at first. Then suddenly he remembered, and he sat up quickly. He drew his hand across his forehead and brought it away covered with blood. Something had gone amiss with their experiment.

A feeble moan at his side caused him to search through the fuzzy substance that carpeted this strange realm and he came across the figure of his friend, Minott V8CA. He had been injured likewise, but they soon discovered that nothing more serious than broken scalps and minor bruises had been sustained by either. Then they arose and had their first sight of the new surroundings.

It was a brown and green landscape that met their view—not greatly unlike the countryside of their own world as it had existed many centuries previously when it was thinly populated. The sward beneath their feet was of great depth and it was fine-stranded and soft like a woman's hair. But it was green—a warm yellow green that was pleasing to the eyes of these city-bred mortals. At the edge of the clearing in which they stood there was a fringe of tall plant life closely akin to the trees of their own world. These had smooth trunks of a reddish brown hue and rose for a considerable distance before branching into foliage. The foliage itself was of the same warm green as the grass and massed about the tops of the trunks in round, symmetric clusters. The air was balmy and warm—a gentle breeze stirred the soft carpet of the clearing into rippling waves that lapped at the shadows of the forest like the swells of a calm sea.

"What a beautiful place!" exclaimed Grayson, "But how is it that we were thrown here so heavily and that we did not arrive at the point on which the ray was focussed? There was a lake at that point, with a sandy beach and with habitations visible in the near distance."

Minott rubbed his bruises ruefully. "I see it all now," he exclaimed. "When we combined the Rollin apparatus with the super-microscope, the ray was deflected an infinitesimal amount by the introduction of our hyperphysical entities. We are probably quite some distance from the point of original focus and at quite a different elevation on the miniature world. That is why our landing was not so gentle."

Grayson had glanced at the sky and he gasped in utter amaze: "Why, there are three suns in the heavens!" he cried.

AND such was the case. One shone hotly red and was exactly overhead. The other two, of smaller size, shone paler and with a colder light. These two were close together but fully fifteen degrees from the first and the net result in lighting their surroundings was a brilliance seemingly even greater than that of their own sun and of similar quality as regards color of the light. The multiple shadows lent a strange triple complement to their movements.

"Yes, I expected that," replied Minott, "This atom, which is now our universe, contains quite a number of protons of which these three are self luminous. If it were an atom of gold, whose atomic number is 79 and the atomic weight 197, there would be 79 protons in the nucleus. In addition there would be 118 protons to make up its weight as well as 118 electrons to neutralize these 118 protons. About the nucleus there would be 79 additional electrons to neutralize the 79 protons comprising the atomic number. Of course this universe is a much less complex one than an atom of gold, but it is far more complex than an atom of hydrogen, which consists of but one proton with a single electron to neutralize it."

"Then we must expect many things to be different than those existing at home?"

"Yes indeed, and interestingly so. And do you know, Grayson, we must make up our minds to remain in this place for we shall never be able to return to earth."

"What! We can not return?"

"No. I was far too optimistic in my setting of the time switch. According to my watch we have been here nearly thirty minutes already. We were probably unconscious for a third of that. The apparatus has long since functioned and we are still here. Of course the ray of the super-microscope having been deflected from its true course by our advent, we were lost to it on its return, for it would impinge at the point of original focus, which point we missed. We are doomed to remain."

Grayson gazed gloomily at his mentor. "Fine fix we are in," he commented.

"Yes. And it's all my fault for being too precipitate and not taking time to prepare more carefully."

The great scientist was so crestfallen that the young man burst into laughter. He threw an arm about the older man.

"After all," he said, "What does it matter. We have but little at home that we may not have here. Since both mother and father are gone I have no one but you—and I still have you. There is your home and position, of course, but insofar as family ties are concerned you are similarly situated. And we can make a place for ourselves right here. Probably we shall be better off."

"Bravely spoken my boy," said Minott, with an answering hug. "And now suppose we explore a bit and orientate ourselves."

Undismayed, they set forth toward the forest.

For two hours they tramped through the unfamiliar multi-shadowed depths of the wood, stopping often to examine some new growth that was discovered. It appeared to be a trackless jungle, peopled only by furred and feathered creatures of small size and timid nature. Then suddenly they came out upon a road, a smooth highway of glistening metal that wound its way through the forest.

"Well, this is encouraging," said Minott, "All roads lead somewhere—in both directions. Which shall we try?"

"The forest looks thinner to the right. Why not that way?"

"All right. Let's go."

With little thought to the future they trod the silvery road for several miles, as they would judge distance on earth. They were nearing the edge of the wood and were suddenly in the open.

The three suns had sunk so low that the two smaller ones were close to the horizon. The period of the first twilight was about to set in, but ahead of them in the slanting rays, there gleamed a magnificent city, a city of towering walls and great spires and domes, all constructed of the silvery metal on which they walked.

They stood spellbound for a moment before advancing further. Each was so impressed with the grandeur of the sight that neither spoke a word. Then there came a ringing command. Each was sure that no sound had broken the stillness, yet that command was heard as surely and clearly as if shouted in their ears.

"What was that?" asked Grayson in astonishment.

"You heard it too? It was a distinct command to stop, though I am sure there was no speaker."

"Exactly as it seemed to me."

Undecided they remained rooted to the spot for a space. Then Grayson took an experimental step. Again came that insistent demand and he withdrew the foot he had thrust forward.

Then there came a roar from the skies and a huge cylindrical vessel swooped directly before them, alighting on the metal surface of the road as lightly as a bird. The voice that was not a voice spoke to them once more.

"Approach closely," it commanded.

They obeyed in some little trepidation, drawing near to the strange conveyance and stopping as a small square opening appeared in the side nearest them.

"Enter," came the insistent, unspoken command.

They stepped through the opening into the cylinder.

In a New World

THE darkness sprang into intense light as the door closed behind them. Blinded to the point of hypnosis, they saw nothing but eyes—eyes that glared and stared; inspected them as if they were laboratory specimens of an infinitely inferior sort.

Then that blinding light was gone—gone so suddenly that the darkness seemed terrifying. But it was not for long. The unspoken voice came once more. "They are different!" it said.

Soft hands laid hold on them, flabby fingers pawed their bodies.

"Ugh!" protested Grayson.

Then they were in a room of comfortable brightness and warmth. Six pairs of the eyes regarded them, and for the first time they were aware of the features in which those all-seeing, all-knowing optics were set. These were not the creatures they had viewed through the super-microscope. Far from human was their appearance. But there was more of intelligence—of sinister cunning and evil intent in those blue-rimmed eyes than in the most despicable and villainous of mortals. The heads were hairless and globular, the parchment-like skin drawn tight over the ugly skulls. Ears they had none—nor mouths—nor chins. Nothing there was that marked them as human, save those eyes—and these were superhuman in their penetrating quality and discernment.

Again there came the voice that sounded not: "Creatures of exceptional knowledge," it said, "whence came ye? Surely not from the savage tribes of Els, nor from Pra or its satellites. In our solar system there are no other inhabited planets. Then, whence came ye?"

Grayson and Minott stared at one another without making reply. Each had understood the questions propounded, yet neither comprehended fully, nor had they heard an uttered sound.

"Reply!" came the command. "Full well we know that thy lesser intelligences are incapable of communicating with such as we, on the terms of equality. Yet, from the impulses that come to us, we are aware how ye communicate one with the other. Ye are possessed of antiquated organs, ears, lips, bronchial tubes, like the Elsians. Speak then, that we may read thy thoughts."

The older man was struck dumb, but Grayson's youthful vigor asserted itself in rising anger.

"We are from Earth," he said, "on a friendly mission. And we are astonished at the unfriendly reception we have been accorded."

"Earth?" came the voice that was unhearable, "Why speakest thou that which is untrue? Thy words, though we hear them not, convey to our superior minds meanings that are false."

MINOTT nudged his impetuous partner into sullen silence.

"Earth, as we call it," he repeated in a conciliatory voice, "is a planet of another and far away system. My friend speaks the truth. We are from Earth, and we have no enmity against the peoples of your system."

"Thou liest as well! There is but one other system—the system of Oc, and that is so far distant as to be unreachable."

Grayson and Minott felt themselves seized by forces of great power and of unknown source and nature. They struggled to no avail. There was a quick jerk that threw them to the hard floor, and they knew the ship was in motion. The light and the penetrating eyes were gone and they felt about in the darkness until they found each other.

"Well, this is a fine welcome!" exclaimed Grayson.

"Yes, and the worst of it is that these beings are not even inhabitants of the world we came to visit. What they are doing here I do not know, but they are not the people we saw through the super-microscope and it seems they are unfriendly to them as they are to us. What the object of the enmity is, is another thing."

There was a sudden swift descent of the vessel, a crash, and it came to rest. Windows opened on two sides of the room they occupied and through the thick glass, or whatever transparent medium it was, they saw that the ship had descended in the city of gleaming metal. They became aware of great activity within and of much clamor without. A cloud of dense vapor obscured their vision for a time, during which period the activity within increased and they could hear heavy footsteps and the moving about of bulky objects. The mist cleared and they saw a mass of red-gowned humans—humans like themselves, with perfectly formed featured. But this mass of beings lay in pitiful heaps in the center of a great square where there was no other living thing save three of the earless, mouthless, large-eyed creatures who poked about among the bodies. They were removing the valuables from the persons of those unfortunate victims of the deadly gas.

The blinding light from within assailed them suddenly and, blinking dazedly in its glare, they saw five of the red-gowned humans thrust into their own cell and thrown to the floor. The artificial light vanished as suddenly as it had come—then the daylight as well, for slides of some sort were drawn across the transparent windows.

"Wonder if we can make ourselves understood to these other prisoners," said Grayson.

There was a reply, another wordless communication, a mental impression transmitted from the mind of one of these beings.

"We understand," it conveyed. "You have but to speak for a few minutes and we shall be able to converse with you in your own tongue. Proceed."

Minott spoke slowly and distinctly. "Grayson," he said, "this is a remarkable demonstration of telepathy. Those of the great eyes possess the same power, but something tells me these Elsians, as I presume our fellow prisoners are called, have the keener intelligence though they are apparently at the mercy of the great-eyes. The ship is moving once more and I suppose we are being conveyed as captives of war along with these five who have just been incarcerated with us."

He spoke for perhaps five minutes along the same lines. Then he was interrupted by a gentle voice, a voice of singing quality that pronounced his own uncouth English in accents that made of it a language of smooth beauty.

"You have spoken truly," came the voice from out the stygian darkness," and sufficiently to enable us to converse with you. We have learned the mental communication of the Prags—the great-eyes as you humorously termed them. But such communication is forbidden in all Els. We prefer the spoken word as we do not wish to evolve as have the Prags—the pirates who prey on the entire universe and who have become hideous in appearance. From where do you come—one of the satellites of Pra?"

"No," Minott responded. "We come from another solar system—from a planet called Earth."

"From the system of Oc?" asked the gentle voice.

"No, from still further."

"Further than Oc?" The voice was frankly astonished now, but not incredulous.

"Yes, much further than Oc. As we measure distance in our land, it is but a fraction of an inch to our own home, but in your terms, which we know not, it is an unthinkable distance."

There was puzzlement in the reply and Grayson nud-

ged his friend into silence. At that moment the blue glare of the lights dazzled them once more, and one of the Prags entered the narrow chamber. Then there was a gradual softening of the brilliancy until the earth visitors were able to make out clearly the ugly form of the Prag.

The short body, surmounted by the immense bulbous head that seemed to be all eyes, was clothed in a single baggy garment of leather through which the emaciated arms and legs projected. At the waist, the garment was drawn together by a broad sash, from which depended a wickedly curved knife and a glittering mechanism that appeared to be a hand weapon of some sort. The lidless eyes with their strange blue rims and bloodshot intensity peered through and through the prisoners from the earth.

"You are to appear before the Kama," they were commanded by the thoughts of this creature.

Minott and Grayson, without volition and propelled by a power from without their consciousness, rose meekly and followed the Prag from the room, leaving behind them the softly muttering Elsians.

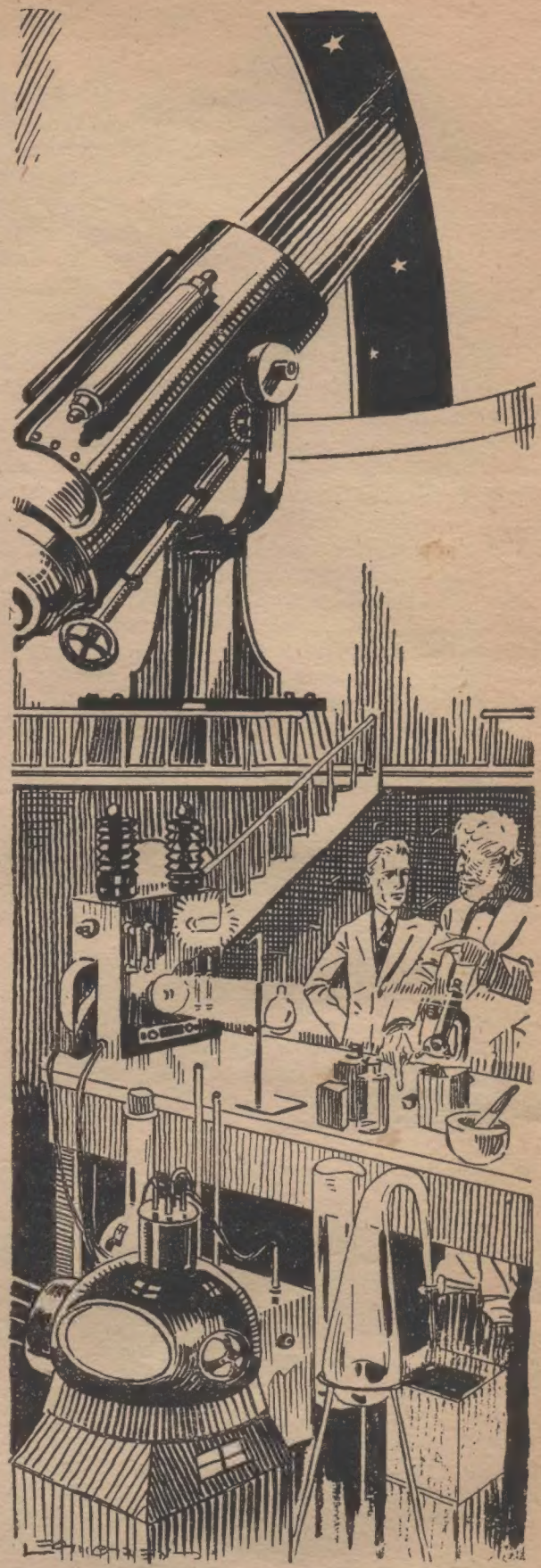
Silent Commands

THE Kama proved to be the commander of the swiftly moving ship and he faced them in a forward compartment whose transparent sides revealed to them the glories of the sub-universe through which they were traveling. From the mind of this officer there came the command to observe the heavens, and he watched them narrowly as they gazed through the windows.

Far below them was a swiftly receding orb that they knew was the planet Els from which they had been abducted. The super-microscope had shown them a similar view of the sphere. But there all familiarity ceased, for they had not shifted the focus of their instrument after discovering the one inhabited electron. To the left there shone the three suns, the red one displaying a magnificent corona of flaming streamers that dazzled them with its glory. The two smaller suns, those of the cold light, had no coronas but shone with the wavering radiance of enormous mercury vapor lights. The firmament was of ebon blackness and was dotted with no less than fifteen major bodies and countless more distant stars and nebulæ. Ahead of them there loomed a rapidly nearing body that shone with a yellow light and about which revolved two smaller bodies, one of a greenish hue and the other the same tint as the parent body. The speed of the pirate vessel must have been terrific, for the shifting of size and position of the visible bodies was inconceivably rapid. They would arrive at their destination very soon indeed.

"It is as I thought," the mental message of the Kama interrupted their thoughts. "My Prags were mistaken. Thou hast told them truth. Thy thoughts are entirely unfamiliar with this system as well as with Oc, the island universe out beyond the twenty-seven planets. For this thou shalt be saved and shall commune with the scientists of Pra. Long have they theorized on the possible existence of universes within universes, of matter divided and sub-divided to the point where little exists save empty space. Thou comest from a vaster universe wherein our system is but an infinitely small particle. Is it not so?"

Minott stared agape. "It is true, Kama," he said,



He made the final adjustments to the apparatus, directing the reflectors of the Rollin mechanism to include a tiny disc he had attached to the super-microscope. Grayson was somewhat apprehensive as he watched the setting of the time switch, but he had no thought of reconsidering

"but little did we think to find theories similar to our own in this realm, nor to find a combination of savagery and enlightenment such as the inhabitants of Pra seem to have. What is the meaning of it all?"

"It is an inheritance from the distant past," came the unspoken reply. "Not all inhabitants of Pra are Prags, as we are termed by the Elsians, but the Prags are the rightful rulers of our universe. It has been thus from time immemorial. But ruling the universe in peace is an impossible accomplishment. Therefore we, the chosen few, dominate by force the remote provinces of Pra itself and the entire universe of which it is part. This we do by swooping down on the provinces regularly, levying tribute in the form of man power and of wealth. It is divine inheritance, a prerogative none can gainsay. By the outlanders we are cursed and feared, are termed buccaneers, pirates, freebooters. Yet it is our right. The Prags must exist not by labor but by their superior mentality. The inferior races of our system must pay constant homage and provide us with the living and luxuries that are ours by divine right."

"You meet with no resistance?" asked Minott.

"Occasionally. But it is futile. The outlanders are not sufficiently clever to outwit the omnipotent, omniscient Prags."

Grayson sputtered his wrath. "Of all the conceited, vicious tommy-rot I ever listened to, this is the vilest. The Prags are nothing but drones—drones that sting however, and that live by the labors and sufferings of the less fortunate. Possibly those ugly skulls of yours contain more gray matter, but the Elsians have the better qualities. They have kindness, love, and tolerance in their make-up, whereas the Prag is utterly devoid of the finer feelings. It is a disgusting exhibition of evolution as a coldly scientific proposition—without pity, without tenderness, without love. Instead of the gods you have set yourselves up to be, you are monsters that should be destroyed. Would that some power could blast you from the universe; destroy your ugly bodies and minds—not your souls, for you have none."

Grayson breathed hard as he concluded. Minott feared mightily for the result of this bitter speech. But the unspoken reply was without rancor.

"Thou hads't done better to save thy breath," it came through to their minds. "Thy feelings are known. The mental attitude registers with us far more easily than useless speech which we can not hear. But it is pardoned; it is expected; it is merely the hatred of the slave for its master. However, you two will prove interesting and valuable to our Great Ones, whom you shall soon visit. From them you can hide nothing."

There was no adequate reply, so the two earth men remained mute, staring moodily at the great shining sphere that now loomed so large in the heavens. The Kama nodded and the Prag who had brought them to his presence came in and led them back to their cell.

A voice greeted them from the darkness as the door clanged to behind them, the soft voice that now spoke their language.

"What is to be your fate?" it inquired solicitously.

"We are to meet the Great Ones, whosoever they may be," replied Grayson. "We are to tell them of the world from which we come and to discuss science with them."

"That is a far happier fate than ours," came the gentle voice, "You should be thankful that your lives are not to be sacrificed in the mines and workshops of the Prags, as are ours. We have no hope."

"Is that what becomes of the captives from your land?" asked Minott. "Surely the few of you who are with us in this cell would not be sufficient excuse for the raiding trip of this immense ship."

"We are doomed to hard labor under conditions of such grueling severity that our lives are shortened to less than half their normal span," spoke the voice, "And as to the number of the captives, we five are but a small proportion. There are four great prison cells in these vessels. Each contains one hundred Elsians. We five are merely an overflow and were thrown in this small cell with you two because there was not room. They have also brought large quantities of precious metals from our city."

"What rotten scoundrels they are!" exclaimed Grayson. "Do such raids occur often?"

"Only often enough to replenish their stores and to replace the workers who have died off in their misery. But there is also the raid, or rather the expected visit, when they compel us to give up three hundred of our fairest maidens. This occurs once during each revolution of Els."

"Once a year!" exclaimed Grayson. "Good grief, do they take your women for mating purposes?"

"No. Merely for their amusement—to grace their debauches and orgies, and to die, before their time, of shame and of physical decay brought about by the life they are forced to lead. No, the Prags do not mate with our women. That would pollute the strain they have so carefully evolved through eons of time."

"Horrible!" exploded Grayson. "Can nothing be done to forestall them? Have you not retaliated? Can you not organize man power and materials to destroy these beasts?"

"Hush!" replied the Elsian. "We must not speak of such things. Our every word may even now be going on record and be used against us. There are plans, but we must not speak of them."

Grayson and Minott shivered with horror at the tale of the Elsian. Neither replied. And then they felt a retardation of the speed of the vessel. It came to a sudden stop.

"We are about to land," spoke the invisible Elsian.

"Yes, in the land of the Prags," said Grayson, with loathing in his voice.

The City of the Prags

THE scene on the landing stage in the city of the Prags will remain forever impressed on the minds of the two earth men. A vast, mirror-like surface it presented and there were gathered thousands of the misshapen creatures to welcome the return of the raiding vessel with its load of treasure and prisoners. The sea of pink, upturned expanses of flesh that were containers merely for the huge brains and the staring optics overcame them with nausea. To think that these monstrosities were in the ascendancy over the handsome and kindly Elsians!

They were sickened at the brutal handling of their more than four hundred fellow prisoners and Grayson cried his rage aloud at sight of a number of aggravated cases in the prodding and beating of stragglers and rebellious captives. The three suns shone on the scene with even greater brilliance than they had in Els—evidently Pra was considerably closer. The atmosphere was heavy and foul as opposed to the sweet-scented, in-

vigorating air of Els. There was a haze over everything and the humidity was such as to bring beads of perspiration to the brows of the earth men. In perfect uniformity on all sides of the great landing stage, there rose towering buildings of ebon blackness—not the glossy black of jet, but a dead, lifeless charcoal that reflected so little light as to cast a pall of gloom about them.

In the confusion attendant upon the landing and the disposal of the Elsian prisoners, Grayson and Minott had drawn aside unhindered and apparently unnoticed. They were now approached by the Kama and, by exercise of his will, he compelled them to follow him. They walked through staring crowds of the detestable Prags and entered one of the gloomy buildings at the edge of the landing stage.

No hand was laid on them, yet they were forced to proceed in the desired direction as inexorably as if they had been bound and carried. They were taken into a lift which soon bore them to the uppermost portion of the structure. There, on the top level under a vast expanse of the transparent material used in the windows of the ship, they were brought to the Great Ones. The huge compartment was a veritable conservatory. It bloomed with strange and rank vegetation. Tall, serpentine growths of ghastly gray hue spread sickly fronds to the uppermost heights under the transparent covering overhead. The earth men wrinkled their nostrils in revulsion at the offensive odors of the plant life that was evidently admired by the Prags. They moved slowly through a passageway between the growths and soon reached a sort of dais on which there were three cushioned divans set in triangular formation in the full glare of the Pragian sun. On these reposed the Great Ones.

Mere brains were the Great Ones. Their bodies were shrunken beyond all belief and the huge, semi-transparent heads lay helpless amongst the cushions, the immense eyes presenting the only evidence of life in the weird beings.

The Kama bowed low and Grayson and Minott perforce followed suit, though they raged inwardly. In stupefied silence they peered into the eyes of the Great Ones, and, for the first time, Grayson observed the nature of the blue rims about the unblinking orbs of these, the highest type of Prags. They were porous areas, and the minute pores opened and closed rhythmically! They were the breathing organs of the uncouth things! But the discovery detracted not one whit from the hypnotic effect of the bloodshot eyes.

"Beings from the great outside universe," came the thoughts of one of the Great Ones, they knew not which, "you come at an opportune time. We have but recently discovered the existence of your universe and would learn more of its extent and peculiarities from recent dwellers therein. We would likewise know how your advent into our system was accomplished. Speak."

Minott replied, "Our universe is to yours as is yours to a grain of sand by the seashore. We entered by means of an extremely powerful microscope and the fourth dimension."

"Thy first statement is understood and conceded. But as to the second, there is some doubt. Concentrate on this instrument of which thou speakest, that we may read of its construction and operation."

Grayson exploded, "Don't do it, Minott. The beasts will try to reverse the process and enter our own system."

"Objections are useless," replied Minott to his hot-headed ward. Then he continued in an elaborate description of the super-microscope while Grayson fumed and fretted at the seemingly indiscreet speech of the scientist.

"It is well," came the approving thoughts of the Great Ones, "Thou hast the intelligence to know that the information should have been purloined from thy very brain hadst thou not given it willingly. But it is enough for the present. We shall commune further at a later time. Meanwhile thy friend is condemned to the mines. He is of inferior intellect."

Minott protested sorrowingly. Grayson endeavored to attack the monstrosities that lay so smugly among their cushions, but the mysterious power once more gripped him and he was led helpless from the presence of the Great Ones. Minott's eyes followed sadly.

THE treatment accorded the scientist was greatly different. At a command from the Great Ones, two slaves entered their presence and were ordered to convey him to certain living quarters. To Minott's delight, these slaves were Elsians who had kindly human countenances, and seemed overjoyed at being permitted to serve a creature so like their own kind.

He was conveyed to rooms that, but for the difference in colors and kinds of materials used, might have been in his own land. But he walked the floor with his mind constantly on Grayson. The two Elsians stood aside patiently, as they observed the dejection of their new master.

Clearly to him then came the mental message, "You are worried about a friend?"

Minott peered startled at the nearest of the Elsians who was smiling commiseratingly. "Er—yes," he said hesitatingly. "My friend from another world, who has been condemned to the mines."

"Speak further," came the encouraging message. And Minott poured out his heart to the gravely listening Elsians. He told of Grayson's childhood, of his later life, of the experiment that had brought them to Els and resulted in their capture by the Prags. He concluded with a hopeless note, as he told of the scene in the place of the Great Ones.

"Fear not," came in perfect English when he had finished, "the time is close at hand. Grayson will be rescued, as will all of our people when the great day comes. You have but to be patient and obey all commands of the Great Ones. Through our secret system of communication, we shall learn of the whereabouts of your friend and arrange for the interchange of messages between you and him."

Minott was astounded at the facility with which this Elsian had learned his own tongue—more easily than had the first in the space ship. But he was elated at the hope held forth and was about to make eager reply when there came an insistent buzz from close by.

One of the Elsians left the room hurriedly and the other—he who had spoken—laid a warning finger to his lips and busied himself with the appurtenances of a dressing table. Minott knew not what to expect.

There was complete silence for a moment. Then two Prags entered the room, bearing between them a golden sphere of the diameter of a large pumpkin. With a curt nod from one of them, the Elsian servant was dismissed and they set the shimmering globe on a table.

Drawn to the beautiful polished object by an irresistible force, the scientist found himself gazing into depths of wavering brightness that soon resolved into scenes

on the other electron planet, Els. With great rapidity the scenes shifted, outlining in rapid succession an entire continent and picturing city after city similar to the one they had first seen. Rural districts were also covered, particular attention being paid to the vicinities of small bodies of water. Then suddenly he recognized the locality they had been observing through the super-microscope. His start of recollection brought about the immediate cessation of the action of the sphere and a mental message came at once from one of the Prags:

"It is well. The location of the ray is determined."

They marched solemnly from the room without further ado, taking the golden sphere with them. The clang of the door as they left brought a sense of dire foreboding to Minott and he stared helplessly about the lonely rooms.

Among the Elsians

FOR several days Grayson labored with pick and shovel in an underground passage that was so narrow and stifling that he was too exhausted each night to even think of the fate that had befallen him. The material he was wresting from narrow veins in the damp wall of rock was radioactive—no light was needed in these workings—and he knew that his life would be short indeed if he were forced to continue in this place. He had been put into the most dangerous of all the mines. But the physical presence of the Prags was escaped during the long hours of labor, and this was a relief of a sort, though the force of distant wills kept him doggedly at his task. The Prags never entered the diggings where the mineral that supplied them with their main source of energy was obtained.

Then came a day when the Elsian who worked next to him spoke to him in his own tongue. A message had come from above—a message from Minott! It was wonderful!

The scientist was well, it seemed, and wished to inform his friend that powerful forces were at work which would eventually bring about their release from Pra and their return to Els. He was bidden to keep courage.

"But," asked Grayson, "how has this message been relayed to you?"

"By word of mouth entirely. It has passed on from an Elsian servant of your friend and has undoubtedly been repeated a score of times on its way to this remote working. We have perfected among the captives a secret system of communication that serves the purpose admirably, though it is somewhat slow."

"The message gives word of help to come," said Grayson. "What does this mean?"

"It means this," replied Oril, for that was the cognomen of his new friend. "The prisoners on this accursed island have formed plans that will eventually result in the destruction of the Prags and in the liberation of themselves. They will result in the halting of the age-long piracy to which our worlds have been subjected, and in the salvation of the civilizations that have for so long a time been under the lash."

"By what means is this to be done?"

"I cannot divulge the secret until you have been admitted to our council. But this will be soon, and I can tell you that the vulnerability of the Prags has been discovered, and that Els and the two satellites of Pra, as well as the outlying provinces of Pra itself, are banded together to end the dominance of these creatures for once and all."

"You spoke of an island," said Grayson. "Do you mean that the Prags inhabit no part of this planet except a single island?"

"That is correct. The island is known to us as Capis and it comprises less than one tenth of the total habitable surface of Pra. The outlying provinces are populated sparsely and by a miserable race of downtrodden creatures, who were subject to the banditry of the Prags for ages, before they discovered the means of traversing space and transferred their major activities to the other inhabited bodies of our system. The provinces have been bled dry and the peoples are hopelessly retarded in their civilization. They resemble us in appearance, though their skin is of much darker hue, and in some sections they have almost reverted to savagery. But all of that is to be changed also."

"This council of which you spoke. When and where does it meet?"

"At present there is a meeting every night in one of the deepest levels of the mines. But each night those present are a different group and word of the proceedings is carried over to the next night by a single member who thus attends two meetings in succession. This is necessary in order that the Prags shall not suspect us of such activities as they surely would, if any considerable number of us were absent from our quarters on a single evening. Of course we are aided in this by the fact that they feel absolutely secure in their diabolic tyranny over us, and so do not anticipate a rebellion of serious nature. They underestimate the courage and mentality of the long-suffering outlanders, and are thus thrown more or less off guard by their own colossal conceit."

The conversation was interrupted by the shrill siren that called the workers to the evening meal—the siren that told them of the completion of the long day of labor. The two were soon in the great bucket that carried them to the surface, along with some fifty more of their fellow prisoners.

GRAYSON pondered over the things he had heard all through the nightly inspection and during the meal that was presided over so strictly by a number of lower class Prags. These were not of the type that possessed the intense power of will over the prisoners, but enforced their dicta by free use of the lash and in aggravated cases of insubordination, by the use of the ray pistols they carried at their belts. Grayson had once seen one of these weapons used and he carried horrified remembrance of its action in his mind. The unfortunate victim of the crackling blue flare that greeted a minor insolence, had crumpled before his eyes into a heap of putrefaction that rapidly shrank to complete and terrible dissolution. He shuddered anew at the thought and was unable to finish his food.

But the words of Oril had cheered him, though he was doubtful of the ability of the Elsians and other outlanders to conquer these monstrosities, who were possessed of such marvelous mental powers and had evidently been lords of the tiny universe for ages of time.

Later in the evening, when the three suns had set and the prisoners were herded to their underground quarters, he received word from Oril that he was expected to attend the meeting of the council to be held late that night. He was elated over the news and could scarcely remain

quietly in his bunk until the time set for his adventuring forth from the huge bunk room into the dark passages where he was to be led to the meeting place of the conspirators. Oril had given him explicit directions and he knew that he would have no trouble in joining the guide who was to await him. His neighbors were asleep on the low cots that were provided by the Prags in all the bunk rooms, and the lone guard was nodding in the dim-lit corner of the long hall. The faint whimpers of a sick prisoner, a few cots from his own, had ceased and Grayson hoped that the poor devil had found relief from his sufferings in the mercy of death.

Then there was the padding of soft footsteps and in the dim light he saw that two of the upper class Prags had entered and were conferring with the guard, who had started guiltily from his nap at their approach. The newcomers were led through the long aisle and Grayson's heart missed a beat as they neared him where he lay. He feigned sleep and when the brilliant beams of a hand torch were turned on him he opened blinking eyes to their glare. He was discovered as a conspirator, and would never know the plans of the brave band which was setting out to free the worlds they knew from the iron hand of the oppressor!

There was the single command to follow, so he arose from his hard couch and obeyed the order in silence. There was nothing else he could do.

He was conducted to the surface and taken to a small, brightly lighted landing stage where one of the tiny, bird-like air vehicles of Capis awaited. In a moment they had winged their way aloft and were headed for the lights of the city of the Great Ones. What was to be his fate Grayson did not know, nor did he much care—now. He had scented adventure and it was to be denied him. He had hoped to engage in the battle for freedom that Oril had hinted was coming. But he was quite evidently doomed to disappointment and worse.

The drone of the motor and the swish of the flapping wings of the vessel that carried them swiftly toward the city were the only sounds to disturb his train of gloomy thought. The Prags, mute always, did not explain by mental message the reason for his move from the mines back to the city. But he suspected that his and Oril's conversation was known to the Great Ones and that he was to answer to them for his part in it.

Beneath them circled the lights of the great city as the ship swung around to effect a landing. The motor had stopped and they swooped with a rush toward a black square that was outlined by a fringe of orange light. It rushed upward to meet them and it seemed they would surely crash. Then there was a single powerful beat of the broad wings and the little craft alighted without a jar. Below them was the transparent roof of the headquarters of the Great Ones.

Grayson Comes Back

GRAYSON, with rebellion and fury in his heart, neared the throne where lay the three arch-pirates of the atom universe. He longed to lay hands on one of the vile creatures and tear him limb from limb. And when he saw the haggard face of his friend Minott, who sat at a small table adjacent to the dais, he clenched his fists, as if about to carry out his rash desire. Quick as a flash there came the paralyzing of the muscles that was produced so easily by some mental process of the ghastly creatures, and a single unspoken warning that seemed to come from within his own consciousness:

"Cease thy futile ragings," came the adjuration, "The plans of the Great Ones have altered to thy good. No longer shalt thou labor in the mines. This night thou shalt depart for Els in one of our space ships and in the company of thy friend. Minott has been of much assistance to us and, in gratitude, we have granted his wish that thou mayst be permitted to join him in this expedition of our scientists. That is all."

Grayson's tense muscles relaxed. Then they did not know of his talk with Oril! But he cast the thought from his mind at once, fearing to betray himself to their uncanny faculties. Minott smiled wanly and greeted him with open arms. Evidently he too had suffered and continued to suffer.

They were dismissed immediately by the Great Ones and repaired to Minott's quarters to prepare for the journey.

"What is it all about?" asked Grayson, when their affectionate greetings were over.

"It is a plan to attack our own world," came the hopeless reply, "and we are to assist them and act as their guides when they reach there—if they do. I was compelled to give them all of my data regarding the super-miscroscope and the four-dimensional means used by us in reaching this system. They learned from me the location of the ray of my super-microscope where it still impinges on the planet Els at the edge of the lake. Their scientists have calculated that the process can be reversed, and they have constructed a duplicate of the Rollin apparatus in accordance with my description of the mechanism. They reason that they can utilize the ray that still connects the point we were watching in Els with my laboratory at home, and they plan to send one of their space ships, manned and armed, to our world along this beam."

"Is such a thing possible?" gasped Grayson.

"I fear that it is, my boy. You see the time-space relationship can as well be altered in one direction as in the other. By the same means that we adapted ourselves to conditions on this plane, they should be able to adapt themselves to conditions on our own. I can pick no flaw in their calculations, and I am mortally afraid that this unspeakable banditry of theirs is to be extended to our own country. The worst of it is, we are helpless to prevent them."

"But—but," objected the younger man, "if one of these space ships of the Prags is rotated into the hyper-physical plane and then emerges in your laboratory, it will be of enormous size. It can not occupy the available space, if it is of the same proportions there as it is here."

"It will burst the walls of the laboratory like a chicken breaking forth from an egg and will lie exposed to the sky amid the débris of a great section that will have been torn from the upper surface of our own New York. You forget that my laboratory is in the extreme upper level and that the walls and floors of our city structure will crumple like glass against the sides of a vessel of more than 1000 feet in length and with walls as hard as steel and of more than five feet thickness—suddenly thrust in their midst as it will be."

Grayson groaned. He was heart-sick over the change that had come to the beloved features of his foster-father. Minott had aged ten years, it seemed, during the few days they had been in this awful realm. He thought too of the terrible engine of destruction to be

let loose on an unsuspecting world—and of others to follow, for the Prags would not stop at one if the initial venture proved to be a success.

"Is there no way of stopping the brutes?" he asked.

"None that I can think of. Of course we must do everything we can to upset their plans, but I am afraid we are helpless."

There came the sound of the buzzer and Minott paled to a still more ghastly color. "It is the signal," he said, "They are ready."

The two earth men hurried to the great landing stage in the heart of the city and there entered one of the shiny cylindrical vessels, of which Minott had learned there were seven in existence. This time they were not carried as prisoners but as more or less unwelcome, but tolerated guests. They were quartered on the same deck with the nine scientists sent by the Great Ones to complete the plans for sending an expedition into the "Outside Universe." Before they had even settled themselves in their cabins, the ship had taken off and they were on their way to Els. When the Great Ones determined that a thing was to be done, little delay was brooked.

All through the remainder of the night the two men talked, when they should have been resting in their beds. They had been separated for more than a week and each had much to tell the other. It was a matter of great speculation between them as to what the plans of the "outlanders" were for the overthrowing of the power of the Great Ones and the destruction of the entire breed of Prags. The slight information given to Grayson by Oril was supplemented by but little more that Minott had learned from his Elsian servants. But it was certain that the outlanders were confident of ultimately ridding themselves of their ancient enemy and that the day for the culmination of their plans was close at hand. Whether it was to come quickly enough to forestall the Prags in this new venture they did not know. And they discussed matters until the Prag vessel slipped into the dawn-brightened atmosphere of Els.

The vessel was soon close to the surface and the earth men joined the Prags, who had assembled in the forward compartment, where the transparent floors gave them a full view of the scene beneath and where the rising of the first sun could be seen through the transparent side walls. The first dawn of Els reminded them of moonrise on their own world, for the quality of light was similar, though of greater intensity. It would be several minutes before the second of the cold suns rose and one twelfth of an Elsian day before the red glare of the third sun greeted them. The ship was skimming the surface rapidly at an altitude comparable to about one thousand feet above the surface as measured on earth, and the peaceful countryside below showed signs of the early activities of the day. Here and there a farmer with his flock of quadrupeds strangely resembling sheep was thrown into a panic at the passage of the pirate vessel, and at several points early travelers in high speed vehicles that traversed the shining roads deserted their cars and fled into adjacent forests in fright at the same vision. But the ship from Pra kept steadily on, and within a short time they saw far ahead a scene that seemed vaguely familiar. Closer they drew and, as the vessel slowed down, they saw they were nearing the lake they had seen through the super-microscope in Minott's laboratory. They were overhead of it in a trice and the great ship circled about to make a landing. Several Elsians who walked by the shore of the lake ran in affright for their homes—mere huts and cabins that were set back a little distance from the shore.

"The point of focus of the super-microscope!" exclaimed Minott.

He looked at Grayson with blanched features and their hearts sank at the realization that they were about to land in this spot, where they would be compelled to assist their captors in preparing for a piratical raid on their own world.

Preparations in Els

WITH the coming of the pirate vessel to the shore of their lake, the neighboring villagers expected the worst. Knowing there was no escaping the gases and the paralyzing forces of the enemy, they did not attempt to flee the vicinity, but they retreated within doors to postpone their certain doom for as long a time as possible. And when, on the second day, they observed that they were not to be molested, but that the Prags were erecting strange mechanisms in the open outside the space-ship and covering these over with rude shelters, a few of the bolder ones ventured forth from the homes to learn what it was all about. They were still unmolested and they gazed in open-mouthed wonder at the sight of a considerable number of Prags actually at work, laboring with their hands in feverish haste. They were still more astonished to see that the earth-men, of whom they had heard through the medium of their local news broadcast, were aiding the hated Prags. It seemed that there was some difficulty with the apparatus being erected and they saw that the higher class Prags were greatly perturbed over some unforeseen trouble.

As the days passed and nothing happened beyond occasional relocating of the odd contrivances and further adjustments of their parts, some of the natives went so far as to gather around the scene of activity and watch the proceedings with bold curiosity. Upon seeing that the Elsians were given little attention by the busy Prags, Grayson made it a point to wander away from the work several times and mingle with the watchers. In this manner he struck up an acquaintance with one Atar, who seemed to be an Elsian of some standing in the community and who mastered Grayson's speech in a very short time as had been done by others of his countrymen. He made friends quickly with the villagers and advised them as to the meaning of the strange proceedings in the open space at the shore of the lake. In turn he was told much of the plans of the outlanders for conquering the Prags and he learned that the day of reckoning was not far off, though it was more than thirty days in the future, and he felt certain that the experiment with the Rollin apparatus and the focus ray of the super-microscope would be successful long before that time.

He told Minott of these things in the privacy of their cabin aboard the space ship and the scientist was deeply concerned over this fraternizing with the Elsians.

"Grayson," he warned, "these Prags are possessed of uncanny faculties and, though they are now so deeply engrossed in the work at hand as to pay little attention, one of the lower class is apt to surprise you in treacherous conversation one of these fine days and you will pay the penalty at the receiving end of one of their horrible dissolution rays."

"I'll be careful. And besides, I like these people and wish to be friends with them. Our case looks hopeless anyway and if I can do nothing to prevent the atrocities

of these monsters, I can at least show that my heart is in the right place, until such time as the fate overtakes me that is bound to come sooner or later in any event. How is the work progressing?"

"Well, as you know, the reflectors were reset today and the apparatus readjusted. The energy was tried on a test specimen, one of the small rodents they brought with them, and the result left them more worried than ever. The rodent passed into the hyperphysical plane all right, but was returned fearfully distorted and in a dying condition. This has given them pause."

"You old fox," chuckled Grayson, "I'll bet you threw a monkey wrench in the gears somewhere."

"No," was the solemn reply, "I did nothing of the sort. I must admit, however, that I see a fault in the apparatus about which I have not advised them. Fortunate it is that the Great Ones are not here, for they would have read it out of my mind. These Prags have not the mind-reading faculty to so great a degree as have the Great Ones, and I find that I can hide my thoughts from them fairly well."

"Then you think the ultimate success of the project may be delayed for a considerable time?"

"Possibly. But not for long, my boy. These arch-fiends are devilishly clever and they will stumble on to the difficulty in short order—at least within the next ten days, I should say."

"Is it absolutely certain that the ray of the super-microscope is still in operation?"

"Absolutely. By means of the balvanometers, we have located the exact center of impingement and have mapped the entire circle of its influence, which extends well past the village and outlines the view just as we witnessed it back home. There is no question of the workability of their plan, once the Rollin apparatus is in perfect working condition."

Grayson looked moodily from the open window toward the lights of the village. The sweet breath of the Elsian countryside was wafted to his grateful nostrils. How he wished that conditions were different—that he might be free to roam about as he pleased and explore this inviting planet they had so rashly visited. But the arm of the Prag was long, and he knew he could not get far away if he attempted to escape. Besides there was Minott—and the threatened expedition against his own land.

Through the stillness of the Elsian night there came a faint wavering tremolo—a feminine cry that rose in rapid crescendo to a wailing scream. The two earth men were electrified to tense expectancy but the cry was not repeated.

"By George!" exclaimed Grayson. "That cry came from the village and I'm going to find out what it is all about!"

"Steady now," admonished Minott. "How do you expect to pass the guard at the door of the vessel?"

Grayson was busy pulling the bedclothes from their bunks. "Not going to," he grunted, "I'm going out the window."

And, all protests of his friend notwithstanding, he made good his statement. Quickly he knotted the sheets and coverlets into a rope of considerable length and this he let out through the open window. Bidding Minott a hasty farewell after tying the makeshift line to the ring used for fastening the window, he let himself down to the ground and made off through the darkness in the direction of the village.

Reaching the fenced-in grass plot that was the gathering place of the small town, he found that considerable excitement centered about the loud speakers of the local news broadcast receiver. A crowd had collected and angry shouts and protests came from every side. A little group in the center of the square was huddled about a prone figure and Grayson pushed his way through until he saw that an extremely beautiful Elsian maiden lay stretched on the grass in a faint. Over her bent Atar, his friend of the past few days.

"What is it, Atar?" he asked, when close enough to get the ear of the obviously agitated Elsian.

"Lola—my daughter Lola," groaned the stricken man. "She has been chosen for the next lot of three hundred. In six days she will be torn from her home and taken to Capis—a slave to the beasts we hate. And in so short a time we should have prevented it!"

Grayson observed the smooth pallor of the girl's skin, her perfect features, the glossy sheen of her hair as it spread over her shoulders where she lay. Then her breast rose and, with a deep sigh, she turned her head in his direction and slowly opened the most wondrous pair of violet eyes he had ever seen. Atar clasped her in his arms convulsively and sobbed like a child.

"By God!" swore Grayson, "they'll not get her!"

Lola

LATE that night Grayson returned to his cabin in the same way he had left. Minott was sleeping the sleep of exhaustion, so he had no one in whom he could confide. But he did not awaken his friend, preferring to fret and toss in his own bunk rather than disturb him. Finally he drifted into troubled slumber, into dreams of the beautiful Lola who had looked at him so pleadingly, dreams of the Prags and of frightful battles with them, in which he fought to protect the lovely daughter of Atar. His tortured mind was not resting for a moment, even in sleep. He dreamed of Minott—dear old Minott—and the scientist seemed to be delivering one of his early talks to the younger man. He told of the composition of matter, of molecules and atoms and electrons—of the universe of the atom where the electrons were the bodies that revolved about the central sun or nucleus. It came to him that an atom was so small, that if magnified as much as ten billion times—the second stage power of the super-microscope—the outer electrons would appear to be as much as three feet from the nucleus, yet the nucleus itself was still no larger than a pin point. It was all a muddle, yet in his slumbers he knew that all these things were actually transpiring on a minute world that was nothing more than an electron in an atom of unidentified matter contained in a grain of sand that lay on the slide of Minott's super-microscope in the New York laboratory.

In the morning he awoke unrefreshed and the first thing he did was to advise Minott of the happenings of the night.

"Worse and more of it," groaned the scientist. "I thought the annual tribute of three hundred girls was not due for forty-five days."

"So did I. That is what I was told, and the day of reckoning was purposely set for a few days before that time to prevent this very occurrence."

"Well, my boy, we are between the devil and the deep blue sea. Here we are helping the brutes in their attempt to raid our own world and at the same time

you have gone to work and fallen in love with this Elsian damsel who is about to be abducted. Meanwhile the decent folks of this little universe are about to make a break for freedom and the break will be too late to save your new girl."

Minott's eyes twinkled despite the hopelessness of the situation and Grayson could not repress the flush that mantled his features.

"But what can we do?" he countered. "I'll admit that this Lola has made a great impression on me and by George they are not going to get her if I can prevent it. But what can we do?"

Minott spoke solemnly now. "Don't do anything rash, Grayson," he advised. "Keep your eyes open and use your best judgment, but do not forget that we have a powerful enemy to deal with. Our first duty is to our own world, but of course we can do very little to prevent the Prags from carrying out their present plans. Probably the best thing is to submit to things as they are and trust that not too great damage will be accomplished on this initial venture into our universe. Then, when they return from the trip, it will be about time for the action planned by the outlanders and further trouble will thus be averted."

"But dammit, Minott, that doesn't save Lola. And she must be saved. I—I want her."

"You poor boy! Is it as bad as that?"

"Yes." Grayson kicked savagely at the towel he had just dropped.

"Well, run along to the village then and see what you can learn. I'll hold the fort here and—who knows?"

Grayson needed not to be told a second time and the older man watched him with misty eyes as he rushed from the compartment in his haste to be gone.

It was very early and the Prags were late risers, so Grayson did not anticipate any interference with his leaving the vessel. But when he came to the entrance, he found some little difficulty in convincing the guard, that he was merely going for a morning stroll. The guard was one of the lower class of Prags and could not understand the earthman's thoughts unless he was actually speaking. It seemed that the spoken words, though the Prags heard them not, were a medium that facilitated the telepathic process. And when Grayson turned the latch of the door, this low-class Prag laid violent hands on him. Quick as a flash the earth man had him by the throat and was battering the huge head against the metal partition. The Prag fell unconscious and Grayson, stopping only to take the ray pistol from his belt, rushed from the ship and made for the village.

HE had crossed the Rubicon! He knew his life was now forfeit but he was armed. And he was on his way to Lola, come what might.

Atar met him at the cottage door with a smile on his face and Lola's greeting was such as to cause him to flush with pleasure. The girl was radiant and the father hardly less so, for during the night there had come a message from Arun, capital city of the province, calling all of the three hundred maidens to the city with their parents. It was stated in the message that action was to be taken to prevent the turning over of the annual tribute to the Prags, and this statement accounted for the happiness of father and daughter.

Grayson told of his skirmish with the guard of the vessel and offered to accompany them on their visit to Arun, since it was now necessary for him to leave the vicinity in any event, and he felt that he might be of some service in their company. Atar welcomed the offer and Lola's downcast eyes told of her surprise and pleasure. The earth man's heart sang, though full well he knew that the shadow of death hung over them all. And he fondly patted the ray pistol where it lay hidden in his pocket. He did not worry about Minott, for he knew that the Great Ones considered him too valuable to allow him to be harmed as long as there was still information to be obtained from him regarding the outer universe.

The government ronsal, or road vehicle, that was to call for Lola and her father, arrived in a very short time. It was a car of considerable length, mounted on two wheels of a diameter the height of a man, and completely enclosed in transparent material of crystal clearness. From within there came a musical note that told of the high speed of the gyroscope used for balancing the machine. There were four other girls already on board with their families and with the entrance of Lola and the two men all available space was filled. The ronsal started smoothly and was soon rolling over the surface of the metal road with terrific velocity. Grayson learned that it was but a short run to Arun—less than one ul, the unit of time that was the twentieth of an Elsian day.

The ribbon of gleaming metal, over which they sped, wound through a beautiful country, but Grayson saw very little of it. He was too busy gazing into those violet eyes and watching the lips of the beautiful girl at his side, as they formed the unfamiliar, yet rapidly learned syllables of his own tongue. So it was that, by the time they had reached the walls of Arun, he and Lola were conversing fluently in English, and he had even picked up a number of words and phrases of the Elsian language. Atar observed these things with approval.

Once within the portals of the huge gate that raised at their approach, they were escorted immediately to a great council chamber where sat the provincial governor and his deputies. A great assemblage of Elsians was there and Grayson thought that almost all of the three hundred chosen beauties had preceded them. But he failed to see a single maiden that could compare with Lola, though all of them were undoubtedly charming.

There was a short wait for a few more arrivals, after which a secretary called the roll. The Governor then arose and spoke rapidly and forcefully in the Elsian tongue, becoming much excited and red-faced during the speech. At its conclusion there came a great cheer from the assemblage and Grayson noticed that tears of joy coursed down the cheeks of Atar. Lola translated to him quickly:

"He says that the government has decided not to let us be sacrificed" she said happily. "The day of reckoning with the Prags is set ahead and is to be tomorrow, instead of as planned. We girls are to be kept in Arun under government protection and our families as well, while the fighting is going on. The prisoners on Pra have been notified, as well as the inhabitants of the two satellites and those of the outlying provinces of Pra itself."

"Hooray!" exclaimed Grayson. And he grasped Atar by the hand and hurried him to the rostrum, where he requested him to translate his offer of enlistment in the forces of Arun.

There was some staccato questioning by the Governor —equally rapid-fire replies from Atar—and Grayson was accepted.

Grayson Joins Forces

NEXT morning Grayson was outfitted with the uniform and equipment of an Elsian soldier. He was permitted to retain the ray pistol he had taken from the Prag guard and considerable envy was displayed by his fellows over its possession. He requested that he be allowed to bid farewell to Lola and Atar and this too was granted.

Lola gurgled with delight when she saw him and a big thrill came to him as she hugged his arm in her glee and admiration. Atar bid him an affectionate adieu and thanked him profusely for his help and for the courage his presence and support had lent. When Lola accompanied him to the door of their quarters his cup was full, and he bent suddenly down and kissed her upturned lips. Then, in a sudden panic over his temerity, he raced for the square of Arun where the soldiery was assembling. Had he looked back, he would have known that his caress was not unwelcome.

There was a great hullaballoo in the square, and it seemed that all of the population of the city had turned out to witness the departure of the expedition. For the first time Grayson knew what it was all about.

In the center of the square there were two circular pits and into the mouths of these the soldiers were descending. Each of the pits contained a space flyer that had been built secretly during the preceding two years and there were two others of the same type to set forth from another city of Els. The Prags were to be taken by complete surprise.

Grayson joined his unit and was soon within one of the great spheres, that were so different from the projectile-shaped vessels of the Prags. The number carried by each vessel was in excess of five hundred; including crew and soldiery. He was extremely interested in the equipment of the vessel and in the activities of his new comrades. So, when the confusion had subsided and the hatches were battened down, he struck up a conversation with his commanding officer, using his few words of Elsian as an entering wedge. He was much pleased to find that the captain, Erne by name, was able to pick up his own language almost at once as had been done by the others with whom he had come in contact.

The ship was under way in a surprisingly short time, shooting forth from the mouth of the pit like a ball from the bore of an old-fashioned cannon. They were on their way to Pra and Grayson was bursting with curiosity as he questioned the indulgent Erne.

"What is the plan of campaign?" he asked.

"There are four ships leaving Els, two more from Aun and three from Rad. These are the satellites of Pra. It is known that all of the fliers of the Prags are in their own cradles excepting two, one of which is at the shore of Lake Ilo in Els and the other in the province of Trasa in Pra. We will leave our own people at home to deal with the one at Lake Ilo and the outlanders will deal with the one at Trasa. But the nine vessels will attack Capis directly and will be assisted by the prisoners there who are apprised of our coming and of the change in plans."

"But, what weapons are to be used against the Prags?"

"Didn't you know?" asked Erne in surprise.

"No. I had heard vague hints of a recent discovery that was expected to prove effective, but I have no knowledge of its nature."

Erne withdrew from Grayson's belt the cylindrical object which had been given to him with the rest of his equipment.

"You have not been instructed in the use of the trinor?" he inquired.

"I have not had the opportunity as yet."

The cylinder was of blued metal and by earthly standards Grayson would have judged it to be eighteen inches in length and three in diameter. There was a small catch at one end and Erne pressed this to demonstrate the operation of the weapon. There was a shrill sound from within that rose rapidly in pitch until it was a thin scream. Then it vanished entirely but the weapon still vibrated smoothly to the impulses of some mechanism within.

"The trinor," said Erne, "sets up sound waves or vibrations in the atmosphere. As you noticed, the original sound was audible but gradually rose in pitch until it passed beyond the normal response of your auditory organs. But the trinor is still sending forth powerful waves that disturb the air at the rate of twenty-five thousand cycles per second. These are the waves that will destroy the enemy."

"But how?" asked Grayson. "The Prags can hear no sounds of any frequency."

"True. But you must remember that the Prag was originally equipped with ears and auditory nerves the same as you and I. In the course of his evolution through the ages he learned thought transference and the ears were no longer necessary. After many generations of disuse they atrophied and all outer portions disappeared entirely. But there still remained certain of the inner parts and these are still in existence. Two years ago we had three of the enemies in Arun whom we had taken prisoner during one of their raids and our scientists experimented with them until they learned of their susceptibility to the high frequency air waves. You see it happens that certain tiny bones that are all that remain of the Prag's inner ear lie very close to the great vein that supplies the brain with blood. By subjecting the Prag's body to air waves of the high frequency I mentioned, these bones are set in vibration and, due to their contact with the artery against which they lie, a clot is formed which is carried to the brain and causes almost instant death—apoplexy."

"Capital!" exclaimed Grayson. "But are these small hand weapons the only thing to be used against them?"

"No indeed. Among the prisoners in Capis there are sufficient of the trinors hidden to account for the guards below the surface. These are to be used as soon as our space-fliers reach the island. Then each of the vessels will swoop down upon the city, emitting the waves from great generators that are set in the outer hulls. These will cover considerable areas and will account for many more of the Prags. The prisoners will then rush to the city and the vessels will land at the same time, sending forth their fighting men into the streets. The generators aboard our ships will keep up constant emission of the powerful vibrations and the rest will have be done by hand to hand fighting. Not a Prag must be allowed to escape."

Grayson thrilled to the call of battle. The closer they drew to the planet of the Prags the more bloodthirsty he became.

"What is our protection against the gases and the ray pistols of the Prags?" he inquired.

"Against the gases we have newly perfected masks which will be supplied before we land. Against the ray

pistol there is nothing. But we hope there will be few left to use such weapons by the time our large generators have gotten in their deadly work."

"What are the odds against us—in numbers I mean?"

"About nine to one including the prisoners. On the ships there are forty-five hundred fighters and there are about twice this number of prisoners in Capis. There are one hundred and twenty thousand Prags, so the ratio I mentioned is approximately correct."

"Thank you, Captain," said Grayson.

A lieutenant was distributing the gas masks and this brought their conversation to an end. The captain busied himself with the radiophone instrument through which his orders were to come, and the soldiers gathered about the windows where they were able to see the island of Capis with its black central city. The ship was crossing the end of the island and several others of the great spheres could be seen converging on the same point—the city.

There was a sudden vibration accompanying a tremendous, high-pitched scream from somewhere in the ship's vitals. Like the scream of the trinor this rose and vanished, but the vibration persisted. The fight was about to begin!

The End of the Great Ones

GRAYSON felt one of the gas masks thrust into his hand but he was too excited to pay much attention. His face was pressed to the window and he saw that several of the flapping-winged craft of the Prags were approaching their own vessel. So close did they come, that he was able to see the ghastly bulbous heads of the two Prags who occupied the nearest. Then he saw one of them go limp and slump forward in his seat. The second followed suit and the wings flapped crazily, out of control. The bird-like mechanism flew drunkenly and then dashed headlong to earth sending up a cloud of dust as it crashed. The others of the curious squadron quickly joined it and he knew that the wave generators of their vessels were a success.

Along the several roads that entered the city could be seen scurrying groups of Elsians and kindred beings from Rad and Aun. These were the prisoners, rushing from the mines and workshops in accordance with the plan.

Then they were over the city and the nine spheres circled and swooped, their wave generators operating at full capacity. From the square there rose one of the cylindrical Prag fliers and it headed directly toward Grayson's vessel. With a quick spurt the great sphere rose and allowed the pointed metal cylinder to whiz harmlessly past beneath them. It passed so closely that they could hear the rush of its slip-stream through the walls of the ship. Then it too went drunkenly reeling, shooting skyward and circling and diving, completely out of control. Again the wave generators had proved their worth. The huge cylinder went down in the midst of the tall ebon buildings, tearing away walls and roof structures and carrying hundreds of Prags to their deaths in the falling débris. Another of the Prag fliers met a similar fate in an attempted attack on another of the spheres of the outlanders. There were cheers from Grayson's companions and one and all they itched to be outside and in the confusion that reigned in the streets of the city.

Still the great spheres circled the city, spreading destruction beneath them. Two more of the Prag fliers rose to the attack and one of the spheres went down at the successful rush of the first of the pointed vessels. But the cylinder was carried to its doom along with the victim for the swift rush had carried the pointed end through and through the sphere where it stuck, the sphere impaled like an apple on a spike. The second cylinder was dodged by its intended prey and soon went down to join its fellows. There remained but one of the ships in the square and the watchers could see that its crew was deserting and making for the buildings on the edge of the square. Grayson's sphere hovered a moment over the square, then settled gracefully to a landing. The order came to don gas masks and the hatches were opened.

Out into the open filed the Elsian infantry, trinors in hand and looking fearfully inhuman with their eyes hidden behind the huge goggles of their masks. Dead and dying Prags lay in heaps about the square and they had to climb over piles of them in places in order to make their way to the streets. A cloud of the white gas descended on them and they fought their way blindly in the direction of the tall building for which they had started. Grayson stumbled over a body and fell heavily. When he arose, he found that he was alone but he staggered his way through the murk until he reached a wall. He felt along this and fell through an opening which proved to be the entrance of a building. Pushing open the door, he rushed into the corridor, and here there was none of the gas, and the lights were burning brightly. He removed his mask and looked around.

NEITHER Prag nor outlander was in sight and he immediately recognized this as the building that housed the Great Ones. He heard a commotion nearby and walked down the corridor to investigate. In a narrow hall that branched from the corridor he found three of the Elsian prisoners struggling with one of the lower class Prags. As he reached them, there came the crackling blue flare of the ray pistol and one of the Elsians suddenly melted into horrid nothingness. With a cry of rage he drew his own ray pistol, forgetting the trinor, and the Prag turned wide eyes in his direction as the blue flame struck him full in the chest. The two remaining Elsian prisoners were saved and they spurned the shrinking mass of putrefaction that had been their enemy as they rushed to thank their rescuer.

With the assistance of these two slaves he located the lift and the three ascended to the uppermost floor. They emerged under the transparent roof and Grayson grimly set forth to beard the Great Ones in their den, the two Elsians protesting in fear. He paid no heed to their earnest warnings but proceeded steadily along the aisle between the rank growths that had disgusted him so when they first reached the place. When he had reached a point about fifty feet from the dais where he was still hidden from the cushions of the Great Ones by foliage, there came the mental command to stop. But instead of retreating at this evidence that the fearsome rulers of the Prags were in their accustomed places, he pressed the catch of his trinor and waited until the whine of its mechanism had risen to the vanishing point. The Elsian slaves retreated precipitately, but Grayson advanced slowly and cautiously in the direction of the dais.

Slowly he felt the paralyzing force creeping over him but he pressed doggedly forward, using every ounce of strength in his body to drag his benumbed limbs into movement. Then he fell heavily to the floor and had

to pull himself along by grasping the vines and tree trunks along the path with his stiffening fingers. He was in view of the dais now and he saw that two of the Great Ones had fallen victims to the air vibrations, their colossal, hairless heads having dropped to the cushions on which they rested. But the third, though weakening, was still alive and it was this one that was exerting his will power on the hapless earth man. With a final desperate effort Grayson twisted that rigid member that was his right arm until he was able to reach the ray pistol in his belt. But he could not aim it in the direction of the remaining Great One. He struggled and fought, but that arm would not move. Then he concentrated with closed eyes. He spoke aloud.

"Grayson R36B," he growled through clamped jaws, "you're not going to let this devil of a Prag get the best of you—you're not. You must lift that arm and blast him from existence—you must—you must!"

Then, miraculously, he found he could move his fingers—a bit at a time he edged his right arm forward, talking and grunting and berating himself aloud. Then the ray pistol was levelled at the monstrosity that glared at him from among the cushions. Came the blue flare and he was released. His own will power had saved him and he sprang to his feet with a cry of victory. The Elsian slaves came running and they capered in glee at the sight that greeted them from the dais. The power of the Great Ones was no more!

When eventually they reached the square, all of the spherical vessels were landed and the fighting had spread to the side streets. There was not a living Prag in sight and Grayson made his way to his own vessel to report to Erne. He found him at the radiophone and greeted him with a broad smile.

"What have you to report, Grayson," the captain asked.

"I have killed the Great Ones," he replied simply.

"What? Killed—the—Great—Ones?" was the incredulous reply. "Alone."

"Alone."

"For that deed you will receive the highest honors and decorations that can be conferred by the Governor-general of Els. You will be famous."

But the earth man cared not. He was tired and he wanted to go back to Els—to Lola.

The Administration Building Gone

FOR three days they remained on the planet Pra, exploring every nook and cranny that might hold a skulking Prag. Communications from Trasa told of the victory over the Prag vessel that was quartered there. The golden sphere told them that the vessel at the shore of Lake Ilo had not been molested, as the Elsians desired to learn more concerning the experiments that were being conducted.

When Erne told him of this, Grayson groaned. "Captain," he said, "I can tell them all they wish to know of those experiments. And my friend Minott can tell them more. Tell them to destroy the Prags at once by means of the air vibrations. I fear for Minott's safety and I fear for my own world."

"But it is impossible for me to give orders to my superiors," Erne objected.

"Then send one of our ships back. Send me with it and I'll lay the case before the authorities. I tell you Captain, there is much at stake—much."

Grayson was pleading now. He knew that it would be necessary for the greater part of the force to remain in Capis for several more days to make sure the job had been well done. But he pleaded for Minott, for his own peoples. And eventually Erne took it up with the commander of the expedition. After much explaining on Grayson's part, it was finally arranged that one of the spheres was to return him to Arun, and that he was to be allowed to tell his story to the Governor there. He expressed his gratitude in no uncertain terms and hastened to board the vessel that was assigned to carry him back.

During the short voyage he worried constantly. It seemed that the spherical flier was desperately slow, though in reality it made the trip in record time—less than three ul being required.

When they approached the city of Arun, Grayson was in the control room, talking with the pilot. Suddenly he gasped in alarm. The great pointed cylinder that was the Prag's vessel lay crushed in the ruins of what had once been the Administration Building! A vicious curl of white told of the Prag gas cloud that was not yet fully cleared from the streets!

"We are too late!" he moaned, "The three hundred maidens were quartered in that building!"

The pilot looked at him commiseratingly. "You had a sweetheart among them?"

"Yes," Grayson replied. He choked and paled and the pilot maneuvered the ship to as quick a landing as possible.

No sooner were they on solid ground when the earthman donned his gas mask and demanded that he be allowed to leave the vessel. Upon the pilot's explaining of matters to the captain this was allowed and Grayson rushed into the ruins of the building, crawling under the great metal hull of the Prag vessel to get into the débris. He thought he could locate the chambers where Lola and her father had been quartered and he risked his life in worming his way through caved-in corridors and broken-walled rooms until he reached this point. He found the body of Atar and mourned over it, as if the Elsian had been a life-long friend instead of a recent acquaintance. But, try as he would he could find no trace of Lola. He found many other bodies, a few of them of the young girls who were thought so safely housed, but there was no evidence of either the death or the saving of the girl he had loved so quickly and deeply. He crawled from the débris and rushed frantically to the ship which had brought him.

The last vestige of the gas was now cleared away and he found a crowd collected about the entrance of the mammoth sphere. Among them was the Governor, and Grayson elbowed his way to his side. The pilot of the vessel was there and he acted as the earth man's interpreter.

"Were many of the three hundred saved?" he first asked.

Patiently he waited for the translations. This Governor was not as adept at picking up his language, as had been some of the others.

"Yes. More than two hundred were rescued."

The Governor had a list and he looked through it carefully for the name of Lola. It was not there!

The raid had come unexpectedly, it seemed. Out of a clear sky the enemy had appeared and had laid down gas clouds in several sections of the city. A portable wave generator was finally brought into action and the ship was sent down out of control—unfortunately

directly atop the Administration Building. There were thousands of casualties throughout Arun. But the High Command had not suspected that such a thing would transpire.

"Damn the High Command!" said Grayson. "They were wrong, and I have lost Lola—probably Minott too."

He remained in the city, sick at heart. For three days the wrecking crews searched the demolished building, bringing many bodies for identification. But Lola was not among them. When the casualty lists were complete and neither she nor Minott were accounted for, Grayson had an inspiration. Maybe Minott had been left behind! Maybe he was still at Lake Ilo! He would go and find out.

ATTEMPTS to communicate with the village were futile, so the Governor provided a ronsal to carry the earth man to the village. Before he left, there came the general broadcast advising that the remaining three Elsian spheres had left Pra and were on their way home. The celebration over the complete victory was starting as his ronsal left the city limits, but there was no jubilation in Grayson's heart. He was bitter; broken-hearted.

When the ronsal reached the site of the village they found it in complete ruin. The Prags had destroyed it before they left for Arun! But, looking out toward the lake, it was seen that the huts that covered the experimental mechanisms were still standing. Grayson made all haste to reach them and he searched first one and then the others of the rude shelters.

"Grayson!" came a familiar and beloved voice.

Minott stood before him and the younger man fell to his knees and thanked God that the Prags had left him behind. Minott raised him gently to his feet and led him to the largest of the shelters, thrusting him through the door without a word. There in a chair that they had built when they first came, sat Lola!

The young man stopped in his tracks and gazed at her with unbelieving eyes. Then they embraced.

Minott gave them plenty of time; then he stepped through the open door and coughed gently. His face beamed and explanations came fast and furiously.

Half crazed at the death of her father, Lola had made her way to the village only to find it in ruins. She collapsed, but by good fortune Minott found her and nursed her back to health. It was a happy reunion and the three embraced in a huddle from sheer joy.

There came a tremendous wrench, a twisting and warping of the universe, and they stood in Minott's laboratory—three where there had been but two before. Lola still clung to her lover but Minott sprang to the super-microscope and shut off the power.

"What on earth?" gasped Grayson.

Minott glanced at the clock and laughed. "My boy," he said "our two minutes have expired. Our own apparatus brought us back, thanks to the time switch."

"You mean to say that all of that grief took place during two minutes of our time?"

"Absolutely. The time-space relationship you see. Those long days in the atom universe were but fractions of a second here. The Elsians and the Prags and all of them lived out their lifetimes in less than one of our days. I had forgotten that point while we were there. Which reminds me that I must investigate fully the qualities of our focussing ray. It must have the property of altering the time-space relationship optically, for when we observed the Elsians through the super-microscope their terrific pace of living was not apparent."

"But Lola," objected Grayson, "will she live a normal span of years here?" He drew her still more closely in awful fear.

"Of course. The time-space relationship has been altered with her as well as it was with us. You may live happily ever after, my children."

Minott's face was wreathed in smiles and Lola, comprehending that she was in a new and strange land, but not understanding how, was glad. She had found her happiness, and, but for the ache that remained in her heart for her father, was content.

THE END

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The Brain

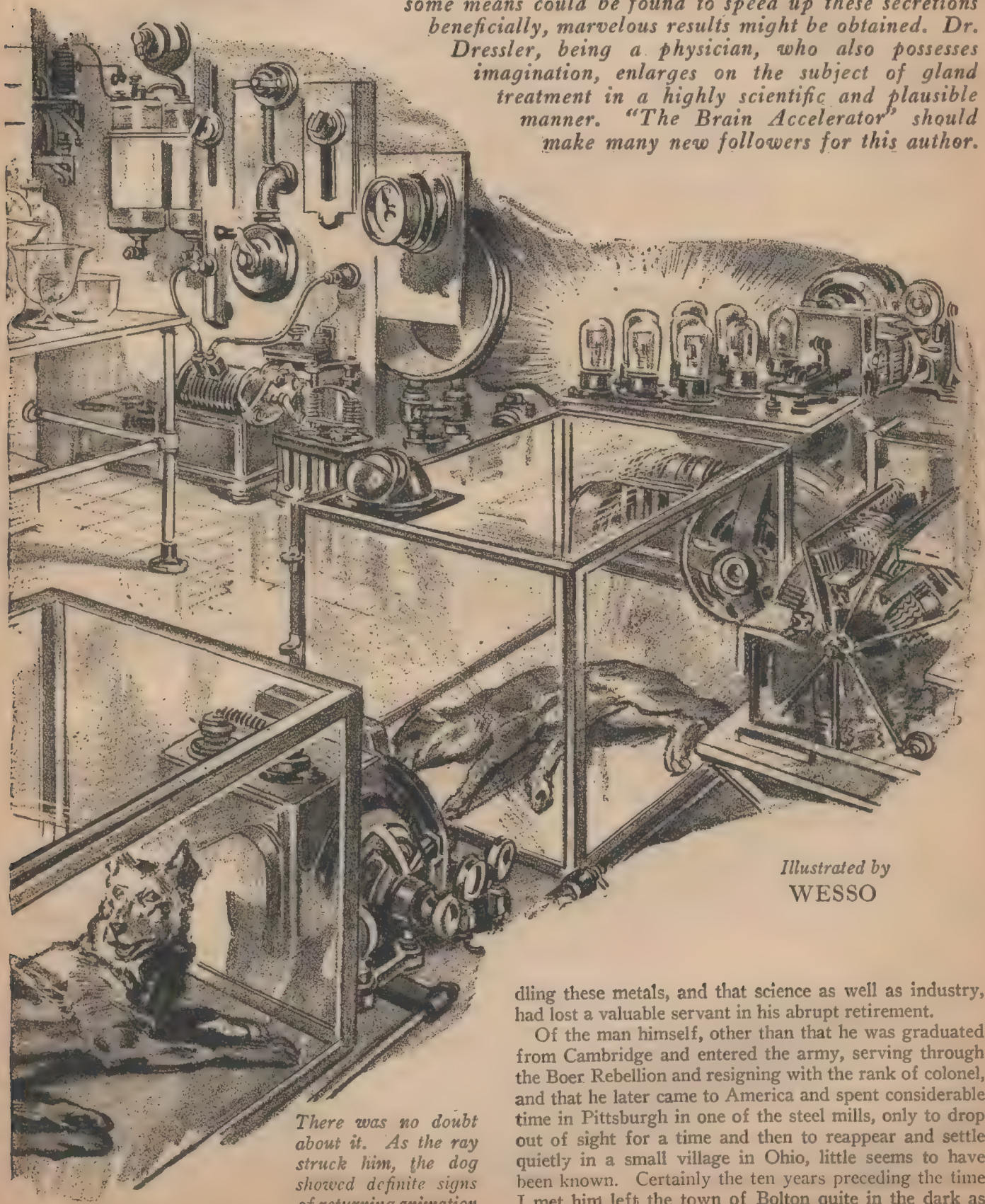
ONLY a few years ago, the study of glands seemed to be taking the turn of a fad. Everybody was talking about the pituitary glands, and the thyroid—and even the endocrine glands—as though it were a simple matter to know all about them. The truth is that the ductless glands do have astounding effects on the bodily organization. Abnormal gland secretions can have the most harmful effects. If

THE case of Colonel Grigsby excited some comment in the newspapers at the time of his demise. Notices appeared not only in American dailies, but also in some of the European ones, while the *London Dispatch* carried half a column on his life and activities, especially those of his earlier days. The *Manchester News*, being the organ of his birthplace, did rather better, mentioning not only his army life but his later years spent in scientific research and ending with a brief (and quite inaccurate) list of his discoveries and patents. The *Scientific Reporter* of Buffalo, New York, did point out that his discoveries in the refinement of aluminum and certain processes in the development of alloy steels were at the bottom of much of the present day success in han-

David L. Fox

Accelerator

some means could be found to speed up these secretions beneficially, marvelous results might be obtained. Dr. Dressler, being a physician, who also possesses imagination, enlarges on the subject of gland treatment in a highly scientific and plausible manner. "The Brain Accelerator" should make many new followers for this author.



There was no doubt about it. As the ray struck him, the dog showed definite signs of returning animation

Illustrated by
WESSO

dling these metals, and that science as well as industry, had lost a valuable servant in his abrupt retirement.

Of the man himself, other than that he was graduated from Cambridge and entered the army, serving through the Boer Rebellion and resigning with the rank of colonel, and that he later came to America and spent considerable time in Pittsburgh in one of the steel mills, only to drop out of sight for a time and then to reappear and settle quietly in a small village in Ohio, little seems to have been known. Certainly the ten years preceding the time I met him left the town of Bolton quite in the dark as

to the colonel's character or even as to his habits. Save for a servant, he lived alone in a huge old house at one edge of town. This servant made most of his contacts with the world, as the colonel kept no car and seldom went abroad, except for an occasional stroll at night through the fields thereabouts.

Perhaps Murphy, his man, might have told something about him, certainly he bore for Murphy an affection that was not conceived in a day, while Murphy in return rendered service that betokened more than habit or the desire to cling to an assured position. But I do not know; Murphy is dead. Whatever he knew of the things that made a prosperous chemist drop out of sight of the world and live as a recluse for the remainder of his life, has died with him. I feel that even were he alive, there was sufficient of an impelling force behind the colonel's actions and enough of a tie between them to insure his silence.

What I have to say bears on Colonel Grigsby's former life and his character other than as I saw him, only secondarily. Yet a full knowledge of that life might tell me whether or not I saw a phenomenon unparalleled in the history of science or whether I beheld only the vagaries of a paretic playing with scientific toys, the ravings of a decaying mind which took its strange bent from the years it had spent in chemical and mechanical pursuits. If I, as a physician, cannot decide on the data at hand, it is doubtful if any one can. Yet I frankly cannot say that I am sure of what I saw, whether the colonel's experiments were far ahead of anything known even now or whether the colonel himself was possessed of the almost diabolical cunning that appears sometimes in a disordered mind and which led him to impose upon me an enormous hoax.

I can only relate what I know and hope that perhaps some one will bring forth enough information on his early life to let me decide. If his *were* a cracked mind, as his actions in leaving the world and burying himself in Bolton to go on with his experiments, as well as the nature of the experiments themselves, might indicate, surely some indications of it must have appeared before. Why all record of his work at Pittsburgh has been buried in the oblivion of nameless files is another phase of the mystery. One thing only I know, my own attempt at investigation has failed. Perhaps some one who reads this, despite the changes in names and places, may recognize the story and come forward with additional facts.

MY acquaintance with Colonel Grigsby (I can hardly call it friendship, although I was the nearest thing to a friend that he had in Bolton) dated from a visit to his house early in January of the year he died. I had been in practice in Bolton about three months, and had heard references to the "Old Hermit" and his exclusiveness, and had seen the house, always heavily shuttered and surrounded by a high and solid, if somewhat dilapidated, wall. Therefore it was a surprise when I received a call one night in a gruff voice to "come in a hurry and bring bandage and sewing stuff along." The call was from Colonel Grigsby's house on the hill south of town. I hurriedly packed my bag with emergency supplies and drove to the gate in the wall around the house. There I was met by the servant, whom I later learned to call Murphy, and was conducted through a path winding between clumps of rose bushes to a side door, that led directly into the colonel's library.

I remember that it was a quiet moonlight night, very mild for January, and with just a light coat of snow over the fields, on the wall, and on the uncared for bushes on the lawn. The house stood at the top of the hill; beyond the gate the road stretched in a gleaming cord to terminate in the shadows around the clump of lights marking the village. Above me as I stood at the door, while Murphy fumbled with a stubborn latch, was a dark height of wall, a full three stories and a dormer gable. On every side was moonlight, making the house seem more foreboding, as no answering gleam came from the darkly shrouded pile. There was nothing to relieve its black expanse and I recall noting these surroundings and idly wondering if perhaps the villagers' hints of something "fey" in the resident of the hill might not have started from someone's view of the house and garden in the moonlight. There was indeed something eerie in the scene.

Within the library the illusion was lost. Here was a conventional large room lined with well filled book-cases and furnished sparely yet tastefully with solid old-fashioned furniture. It was brilliantly lighted by a row of electric bulbs running completely around the cornice. The lack of light without was explained by heavy velvet curtains drawn to completely cover a number of long French windows.

Murphy indicated my patient with a nod and then disappeared through a door opposite to the one through which we had entered. On the other side of the room the figure of a man was lying quietly on a day-bed. He was dressed in an old shirt and trousers and carpet slippers and wore over all a long and heavy laboratory apron. On the floor, as though thrown away in haste, was a pair of heavy goggles with shining thick lenses and borders of grey rubber. His left arm lay on a chair by the side of the couch and was covered with blood-stained bandages.

As I approached he opened his eyes and greeted me in a weak voice.

"I've cut my arm, doctor, and I think the cubital vein is severed. Murphy applied a tourniquet and some bandages but it is still seeping slowly and I've lost considerable blood. Murphy will be here in a moment with hot water; you may examine it and do what is necessary."

At that moment Murphy entered with a large basin of water that still boiled and I removed the dressings and gently sponged away the blood so that I could see the wound.

The cubital vein was cut; a deep gash extending across the forearm had severed skin, fascia, and muscle, down to the tendons. Blood still seeped slowly from the severed vessels; only the prompt application of a tourniquet had saved him from a death by hemorrhage. As it was, he had lost enough blood to make him pale. His pulse was strong and not too rapid, and I decided to apply ligatures and sutures rather than to risk moving him.

I inquired if he thought he could stand the pain of sewing and he smiled weakly and told me to go ahead. I did, however, administer an opiate both to lessen the pain and to minimize the danger of renewed hemorrhage. It took a number of stitches to catch the bleeding vessels and then eight or ten more to approximate the cut muscles and skin, but he stood it all without a murmur. By the time it was bandaged he was nearly asleep. I left a few simple instructions with Murphy, who all this time had stood by my side, evidently anxious to help, yet not venturing to do so without my bidding. Telling him I would return in the morning, I took my leave.

WHEN I returned next day I found the Colonel at his desk, pale and evidently weak, but cheerful and busy with some sort of drawing. When I entered, he dropped his work and greeted me pleasantly and I had an opportunity to observe him more fully than I could the evening before.

He was tall, spare rather than stout, and even seated, he carried his shoulders back and his spine erect in the manner of one who has spent time in the army. His face partook of the leanness of his body; there was a firm chin and full, tight lips; a straight, large nose and grey eyes and a high forehead and the whole was topped by a shock of curly white hair. He wore a conventional business suit with the bandaged arm buttoned into the coat, and presented a picture of some elderly college professor at work in his study, rather than the eccentric recluse that the village gossip had painted.

Seen in daylight there was nothing unusual about the library. The velvet curtains had been drawn back and the room was flooded with sunshine. There were a number of books lying on the desk, a few drawing instruments, a slide-rule, and sheets of drafting paper. In cases lining the walls were hundreds of other books and I saw through a half opened door a large room, that appeared to be fitted as a laboratory or workshop.

I mentally catalogued the Colonel as some sort of scientist; a chemist, perhaps, or from the drawings possibly an engineer. Certainly there was nothing about the place or the man to suggest anything more than an individual with a hobby who desired privacy to work out his ideas at leisure.

While I dressed the wound, the Colonel talked pleasantly, inquired about my school and hospital experience, how long I had been in Bolton, and whether or not I expected to remain in country practice, since so many young physicians seemed to prefer the city. I told him that I had located there partly because it was a good opening; the nearest physician being in the next town ten miles away; and partly because in this place was the State Institution for the Feeble Minded, and that an appointment on the staff permitted me excellent clinical facilities for research in psychiatry, which I hoped to make my specialty. The Colonel's interest seemed caught at this and he asked a number of questions that betrayed more than a cursory insight into physiology in general and particularly in the little understood physiology of the mind. He soon dropped the subject and did not reopen it, although it seemed to me at the time that he appeared to take more than a layman's interest in the matter.

The wound developed an infection in a few days and required frequent irrigations to clean it up. I visited the house on the hill daily for nearly three weeks, and in that time came to feel quite at home with the Colonel. He was always friendly and always interesting. He told tales of the war in which I learned that he had served with the field units of the British forces; he told of his college days at Cambridge, and he admitted that he had studied medicine for three years, before he entered the army. He spoke of research in the laboratories at Pittsburgh and mentioned that he had several patents on basic processes in the manufacture of metals. Sometimes he talked of my own work, quizzing me on brain and nerve anatomy, and taking frank delight in catching me in an occasional error. Where he gained the fund of information that he had on the subject, he never said; I am sure, though, that he must have done a great deal of work upon it at some time, because his knowledge frequently surpassed my own, and I had spent every spare moment in college upon that phase of anatomy and physiology.

I began to enjoy these visits; a physician in a small town has little opportunity to talk shop, and the Colonel's knowledge, while always from the viewpoint of the student and not the physician, was remarkable. We argued and speculated and discussed the reports in the current medical journals, and long after the wound had ceased to require my services I dropped in once or twice a week in the evening. I had free time, my practice usually was taken care of during the day and I went to the Sanitarium only on Saturdays, so that I learned to look forward with pleasure to our evenings together.

How the Colonel filled his days he did not explain. His laboratory was closed when I came at night; Murphy would quietly set out cigars and a bottle of port of which the Colonel seemed fond, and as quietly retire. We talked sometimes until midnight without ever touching upon personal activities. What experiments he was conducting or whether he was writing, I did not inquire. We were both apparently content to enjoy each other's company without too much of the usual intimacy of friendship.

ONE night, perhaps two months after the Colonel's wound had healed, and after our habit of discussion had become quite well established, I entered his library to find him seated by his desk apparently in a brown study. He nodded absently to me as Murphy took my coat and hat, and he motioned me toward a chair and thereafter said nothing until I was seated and enjoying my cigar, which I had lighted. Then he pushed back his chair and asked me abruptly:

"What is the nature of nerve impulse, Doctor?"

Caught off guard by his sudden plunge into matters scientific, since we usually drifted leisurely into that phase of our talks, and moreover fearful of a trick in his question, I temporized:

"Why, of course, no one knows. There are several theories, one that it is a chemical process, another that it is purely electrical in nature and another that it is a vital phenomenon for which nerve tissue has the inherent capability. I believe that the electrical theory has the support of most physiologists now, although it is still an unsettled matter."

"You are right," he said, "except for the last statement. Mathews, along with Koch and Alexander, believed that the nerve impulse extended along the fibre by some chemical process similar to the sudden breakdown of a peroxide or organic oxide, but they were never able to prove the release of heat, which would have been inevitable had they been right. Tashiro thought, when he demonstrated motility in the dendritic processes of growing nerve tissue, that he had the answer in a mechano-vital affair, but he was wrong. It has been proved that it is electrical and I have proved it."

With this simple yet startling statement did the Colonel introduce me to the trend of his researches. I started to question, but he broke in impatiently.

"I know you are going to ask for proof, but let that wait. My discovery is after all incidental to something else and the proof is negative. I know that the nature of nerve impulse is electrical because nothing else could explain the phenomena I have evoked. Let me ask you something more along the same line.

"How does a nerve trunk react to a Faradic current? It functions in its normal manner, nearly, does it not? If

stimulated at the central end of a motor nerve it transmits the current and fulfills its function just as if a motor impulse instead of an external electrical stimulus were sent along it. It tires after a time and refuses to react further until it is rested, which a nerve normally does. If the peripheral end of a sensory nerve is stimulated, it behaves as a sensory nerve should and carries an impulse to the brain. But do you know," he leaned forward in his earnestness, which was now very evidently real, and tapped me upon the knee, "that a 'touch' impulse as opposed to a 'pain' sensation has never been evoked by either Faradization or by galvanic current applied to a sensory end-plate?"

I started to reply that as far as I knew, the last experiment had never been successful but the Colonel interrupted me again.

"Let me finish my premises. There are a number more of them and you will need them all to follow me in my reasoning. Then we can discuss my deductions and after that," he smiled, "we will look over my proofs. "I have run over briefly some arguments on the theory of the nerve impulse being an electrical phenomenon and I meant to suggest in my last question that it might not be purely so, but more of that later. Now, I want to advance another point that bears on what I have demonstrated, or," smiling again, "*think* I have.

"Just how much of the human brain, Doctor, can be eliminated without the death or evident impairment of mental quality of the individual? You have, of course, seen de-cerebrated pigeons, birds with the cerebrum removed and the cerebellum intact, who were yet able to fly when tossed into the air, breathe and swallow food when it was placed in the mouth; in short, who were able to exhibit all the reflex manifestations of life, yet did you ever wonder how much of a *man's* brain could be removed without causing his death?

"Well I have seen (and you probably have also) two ounces of pus removed from a brain cavity that could not possibly hold more than thirty-two ounces, and not only was the pus removed, but the patient lived, despite the fact that two ounces of his brain substance was gone. And I have never heard of a case recovered from abscess around the mastoid which suffered any amount of mental impairment. Brain tumors involving half a hemisphere have been successfully removed with no bad results, unless the area around the Rolandic Fissure was involved. You may or may not recall the case, during the Franco-German war, where a soldier discharged, not a bullet, but the ramrod from his gun, squarely through the skull and the right anterior lobe of his brain, yet he recovered and suffered no inconvenience.

"The cerebral cortex has never been more than very imperfectly mapped. The tracts of medulated and unmedulated fibres have been better understood; we know that the *corpus callosum* connects the hemispheres and that the internal capsule has to do with the collection of fibres that run toward the spinal cord. We know in general the path that impulses follow from the cortex to the cord and from there to the rest of the body, but of the points where most of these impulses originate, we know practically nothing.

"But we do know where many of the commoner manifestations, such as voluntary muscular action impulses, come from, because hemorrhages and injuries to certain limited areas, such as the Rolandic Fissure and the internal capsule, cause definite paralyses. And we also know, as I have endeavored to recall to you, that there is a vast area in the brain where none of the impulses that we manifest in daily life—motor, sensory, and the third great field, the psychic or the *mind*, if you will—do *not* originate, since so much of the brain can be destroyed without interference with any of these functions.

"Now it is axiomatic that nature does not create or rather retain, any structure unless a need for it or a capability for its function maintains. When sea life came to land, it lost its fins or made legs of them. Man no longer needs a tail as his cousin the ape does, so he has lost it, save of course, for atavisms such as the celebrated case of the boy in Hawaii, who is normal except for a well developed tail. We have some nineteen, or is it thirty-nine, vestigial organs, useless hang-overs from earlier forms, in our bodies, yet we will doubtless lose them in time as we have lost our tails.

"The mammals, with man at their head, are the highest type of life the world has known. Physically, man is almost the weakest of the lot, yet he leads because of the development of his nervous system, and at the top, figuratively as well as literally, is the brain. It is not conceivable that nature has endowed man with some four or five times the amount of brain tissue that he uses, unless for a purpose. I believe it *is* there for a purpose. Man has simply never put it to work. It was with this conviction that I followed what I will admit was an accidental discovery of the nature of nerve impulse travel and which has since become incidental, in that it has led to a demonstration of what I last said."

THE Colonel had been pacing restlessly up and down the library for the most of this discourse. As he finished, he sat down again and poured a glass of wine, sipping it slowly while I pondered on his words.

Unquestionably he had stated facts in his premises. Most of them were well known to me, but his deductions were so original and daring that I hesitated at their significance and possibly displayed a perplexity far beyond what a physician should when confronted with ideas in his own field. The Colonel must have noted it, for without giving me a chance to speak, he resumed.

"Another thing. What is memory? Is it a chemical process, a change in chemical structure of brain tissue as the presence of substances like linoleic acid, which in the homely substance linseed oil displays characteristics closely akin to memory, in that it starts to acquire oxygen and so 'dry' under the action of ultra-violet light, only to lose that tendency in the dark and re-exhibit it more quickly when exposed the second and third times, thus showing that it remembered how to dry? Shall we say that memory is a mechano-vital function involving only the relaying of impulses by the synapses between brain cells and that these synapses once made are more easily remade upon a second application of the primary or exciting impulse? Or, is it a purely electrical affair, with our brain-tracts as wires and brain-cells as individual telephones and the ganglia the switchboard? Shall we consider our consciousness, our psychic, as the 'pale lightning that flickers over our brain in tune with our thoughts?'

"That, my friend, I do not know. I have conducted a few experiments that might show something. I would like your opinion on them and your help in evaluating them and perhaps pursuing them to an end."

The Colonel led the way into his laboratory. I followed, my mind in a whirl between the supposition of something totally new in physiological research, and

wonderment that he should have chosen me as a confidant. There was also a trace of suspicion that I might have been listening to the ravings of a brain gone wild, but there was also a lively amount of curiosity about his laboratory and the significance of it and of himself in this little village.

I realized by this time that the Colonel was not only exceptionally well informed in a branch of physiology that is little understood, but that he had the ability and the means to follow his ideas to the end in the acid test of experiment. Such investigations I well knew were usually conducted in institutions, under the direction of one man perhaps, but with the help of a corps of trained workers. It is seldom that any one individual has the means of equipping a physiological research laboratory, coupled with the ability to work there, while it is more remarkable still that such a man should seclude himself as the Colonel had done.

The laboratory opened directly off from the library and from its extent must have covered nearly the rest of the first floor of the house. It embraced a huge rectangular room with an ell leading off from one end. Walls, ceiling and floor were tiled, green at the top and with the lower three feet of the walls and the floor white. There were no windows; in recesses in the walls were concealed lamps, that gave a flood of glareless, shadowless illumination so white as to closely resemble sunlight. At one side was a long bench cluttered with chemical apparatus, test tubes, retorts, and burners. At one end of it stood a miniature electric furnace and I recalled the Colonel's words about metallurgical research. The wall nearest the door had a table running its whole length and on this was a bewildering array of wires and vacuum bulbs and huge X-ray tubes. In the ell, of which I could see one end, seemed to be two or three dynamos and motors and what I at once recognized as the high frequency generator of an X-ray machine, although it was larger than any I had ever seen. Attached by long insulators to the ceiling was a row of heavy copper bars that extended to the bench with the vacuum tubes. A door opened from the ell and through it came a racket that reminded me of the pandemonium always heard in a biological building, where cages of laboratory dogs are kept.

The Colonel led the way to a screened off portion of the bench with the electrical apparatus and drew up two high stools and motioned me to one of them, donning before he sat down on the other, his long laboratory apron. He indicated the rest of the room with a sweep of his hand and asked with some pride:

"How do you like my little workshop? I designed and equipped it myself and you can see that it is fitted for chemistry and high frequency electricity as well as for biology. I really expected to devote my time to chemistry, but I became interested in high frequency waves when Murphy insisted on installing a radio, and that led to all the machinery you see down there and my experiments with it to the biological end I spoke of.

"It was quite by accident that I stumbled upon the matter of nerve impulse conduction, but my results along the electrical theory have been so startling and have led me into such strange things that I need the help of your training to carry them through. Let me beg your indulgence for a few minutes more," as I started to speak, "and I'll summarize a bit and then outline my plans for further work.

"I told you that I conceived the nerve impulse, and probably the psychic or ultra-material phenomenon that we call mind, to be electrical in their nature. Well, they are, although they are related to the high frequency radio waves, much as those electrical manifestations are related to the simple galvanic current. But like both the radio waves and the galvanic current, they are perfectly capable of being produced by machines and controlled. I recalled to you that there are large areas of brain tissue that apparently serve no known function, but that must be capable of function, else they would not be retained. I now tell you that I am able to induce external electrical forces that simulate nerve impulses and can be superimposed upon actual nerves and not only traverse them but also stimulate their own function to a point normally impossible. With this increased functioning comes not only increased travel along peripheral nerves, but an acceleration of brain function and the creation of new synapses or contacts between brain cells with its corollary of a broadening of the organism's reactions to external impressions, an increase manifold of the brain's capacity to *think*. I am able also to induce in animals apparently dead at least a similitude of nerve function and consequently an apparent return to life."

WHEN he finished, the Colonel leaned back upon his stool with a quiet smile and waited for me to speak. I pondered for a moment before the full import of his words came to me. "Acceleration of brain function and the creation of new synapses, the increase consequently of the mind's capabilities to a degree measured only by the amount of brain tissue at present without demonstrable function—the revivification of innervation in the dead and consequently the return of life's most vital requisite"—the proposition held untold possibilities, the creation of a super-mind, education of the human reduced to a simple affair, the return to life of the dead who were without too much damage to their bodies.

The Colonel watched me for a moment and as I still pondered without speaking, drew back the screen behind him and indicated the bench.

There was a glass compartment or cabinet about four feet square and as many high, upon the bench and within it apparently asleep, lay a dog. Suspended from the top of the cabinet was what appeared to be a large X-ray tube with a metal window and another smaller tube clamped fast to its side. Both tubes were in operation, their electrodes gleaming red even in the bright light of the laboratory. The smaller tube was so adjusted as to present its anode directly toward the metal window and through this window came a carefully screened ray of greenish light that played in a thin pencil upon the back of the dog's head.

The Colonel threw a switch and the greenish ray from the tubes stopped. Their electrodes still glowed, but in a moment they too, started to cool. The dog gave a slight shudder, then stiffened and the respiratory movement which had been perfectly evident before, ceased. The Colonel threw open one side of the cabinet and drew out the dog and the glass plate upon which it rested.

"You see he is quite dead," he remarked.

I felt for respiratory movement of the chest and then for heart beat and finally examined the pupils of the eyes and I was forced to agree. The dog was dead, the three phenomena that determine life—respiration, circulation, and innervation—were all absent.

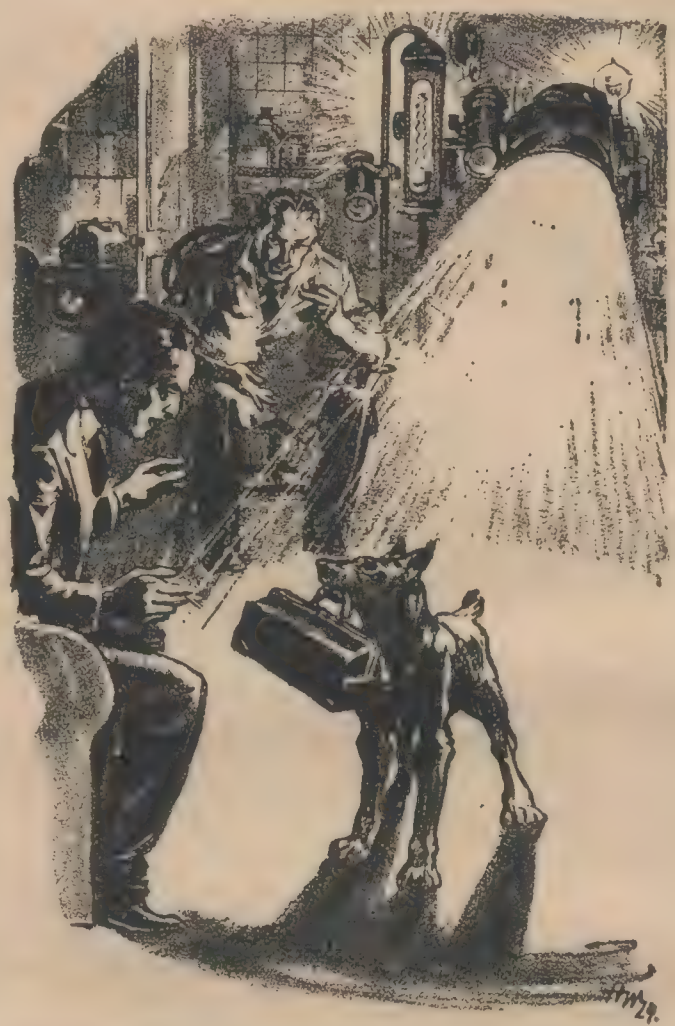
The Colonel said quite simply. "He was dead for several hours three weeks ago, yet you saw him just now

breathing naturally, and had you examined heart and pupils you would have found them functioning."

He turned the side of the case up still more and swung the tubes out toward us.

"This," indicating the larger, "is not unlike a Coolidge tube, except that the electrodes have both gold and thorium as well as platinum in them, while the screen in the window is a special alloy of aluminum, which passes some rays that the platinum-iridium screen does not. The smaller is an ordinary X-ray tube, except that it is of quartz and has as well as the heater and high frequency currents an extremely short wavelength radio carrier wave impressed upon its elements. What the nature of the resultant ray is I'm not prepared to state. I only know some of its effects."

He turned to another glass case holding a dog, obviously dead, although he insisted that I examine it. The animal was quite rigid; the heart was silent and the eyes were fixed and dull; it seemed to me to have been dead some time, despite the fact that there were no signs of decomposition. The Colonel lifted the tubes to connections in the top of this case, similar to the ones in the first. He threw another switch and the tubes lighted. Carefully adjusting a diaphragm arrangement similar to the substage condenser of a microscope, he brought the greenish ray to a small focus and training it upon the back of the head of the dead dog, broadened it until it covered the whole skull.



In a moment he came back with my emergency satchel

"It seems to require considerable stimulation at the first raying," he explained. "There," he narrowed the beam again to a point about the size of a dime and just above the junction of the neck and the head.

NOTHING happened for a moment, but as I watched, the rigid limbs began to relax and the tail moved slightly; the Colonel reached in quickly and gave a slight thrust upon the thorax, and to my amazement, respiration began. Labored at first and somewhat jerky, it soon settled to a regular rhythm and upon the floor of the cage lay, instead of the dead dog that had been there, one that seemed only asleep. The Colonel invited me to feel the chest and I found the heart pumping steadily. Upon turning back the eyelids, I saw that the dull film was gone and as a ray of light reflected from the glass upon them, the pupils contracted to their normal size. Unquestionably, unless I were the victim of an illusion, the dog was alive, asleep truly, but none the less alive.

The Colonel shut the door of the case and snapped another switch. "The temperature in here is kept at 98 degrees but the internal temperature of the body falls slightly below that when metabolism ceases, and it takes some little time for it to return. Also, it will take a few minutes before the dog will be ready for the rest of the experiment."

The Colonel led the way back to the library, where we again sat down. A hundred questions were forming in my mind and struggling there with the reluctant conviction that I had really witnessed what was almost a miracle. Noting his expression, however, that the Colonel had something further to say, I awaited him. He methodically selected a cigar, lighted it, and then continued:

"Perhaps I have stressed my contention on the type of nerve travel impulse too strongly. It seems that the ray you saw must be electrical in nature and that the reaction of the apparently dead dog to it partakes of the implantation upon his nervous system of an extraneous electrical impulse which stimulates a quiescent, yet not extinct function. But I am not sure after all. That ray will penetrate flesh, but not metal if the metal be grounded. It makes a clatter in an ordinary radio very much like old-fashioned summer static. I *think* it is electrical, but I've never proved it, because almost as soon as I discovered it, I fell upon its peculiar effect upon nerve tissue and I have followed that line exclusively since.

"I neglected to tell you that before those dogs were chloroformed to death, they were each given sufficient alkali salts intravenously to insure alkalinization of the brain tissue and so lessen the autolysis which occurs less in the brain, as you know, than in the body, but which is still appreciable within a few hours after death. After they were quite dead, every possible bit of blood was withdrawn from them, defibrinated to prevent clot, a trace of arsenic to check body decay was added, and the blood pumped back. The dog which you saw first has been there three weeks, apparently asleep, the low, but necessary metabolism being supported by a few grams of glucose given intravenously each day. The second was killed two days ago and," he smiled, "has been the subject of further experiment which I hope to re-enact for you in a few moments.

"Sufficient time has elapsed for the dog to have re-

gained his normal metabolic rate, as you might say, to be accustomed to living again, so let us return to the laboratory."

The Colonel opened the case and examined the dog. He felt its body and pried open the jaws to see the tongue. The interior of the mouth was pink and moist; the eyes were still closed but the heart and respiratory rates were normal for a sleeping dog.

He carefully closed the case and adjusting the beam of light until it again covered the whole head, threw another switch. A high frequency generator, something like an old-fashioned wireless telegraph transmitter, leaped into life with a hiss and crackle and instantly the greenish beam became suffused with a million tiny flashes of red that shot from the small or auxiliary X-ray tube and corruscated from the screen down its length. The dog, as the combined ray struck him, moved his head. The Colonel adjusted a dial and the red flashes increased in intensity; the dog stirred further and in a moment opened his eyes and raised his head to look about. He stretched and yawned, just as a man might upon awakening from a natural sleep. The Colonel stopped the machinery and spoke to him sharply. He rose and nosed the glass next the Colonel in friendly greeting. The Colonel opened the door of the cage and out jumped an apparently normal dog. He staggered a moment as he struck the floor, then seemed to recover his strength. The Colonel called his name affectionately and the dog went to him and leaped up with every demonstration of a pet who has just found his master after long separation.

The Colonel stooped and patted his head for a moment and sat down upon his stool. The dog crouched at his feet, then lay down upon the floor and in a moment was asleep. The Colonel motioned me to the other stool, and drawing cigars from his pocket, offered one to me. While he fumbled for a match he seemed to be pondering.

I have tried it on myself

I LOOKED at him expectantly. I had witnessed something beyond the ordinary experience of man, and it seemed better to await his lead before plunging into the mass of questions that came to my mind in quick succession.

He thought for at least a full minute and finally started upon an apparently irrelevant subject.

"Bruno was my pet for years. Was I right to use him? It looks," he seemed to be arguing with himself in an abstracted way, "like betraying a friend. Yet, the other has been unharmed for two weeks and I know how much Bruno knows and he trusts me enough to co-operate as much as any animal can. Besides"—then suddenly seeming to recall my presence, he looked up with a quick smile and said half apologetically, "Murphy rated me soundly for using Bruno in my experiments when I have a whole roomful of curs over there." He indicated the door leading from the ell.

"After I found out how to handle the ray, it seemed to affect them only slightly after the experiment was over and for the next thing I want to show you I need an animal of proven intelligence. Other than an apparent need for sleep and a tendency to lose weight, they seem normal afterward and it is not convenient to use a strange dog when he cannot be confined during the experiment.

"Now," falling once more into his usual manner, "I told you that I had something further to show you and I meant something more than this resuscitation. I felt very elated over that, though I doubt if it will ever be more than a toy as regards its use on humans, until I have gone further along the line that I indicated by my talk on silent areas of the brain. Oh, I know," as I started to speak, "there are a thousand phases of the thing to be worked out, but I am interested now only in this one.

"You have seen that I revived this dead dog by applying through this ray a stimulant which started anew the vital processes that we call life, and which seem to have their center in the brain. Now, whether, as I said before, this is a chemical affair which stopped with death and was started again by some sort of catalytic action due to the application of the suitable electrical charge, or whether it is purely electrical and as such answered to the proper electrical vibrations, I do not know. I think it is the latter, because, as I shall soon show you, the same process can be accelerated or at least one of the manifestations of life can be accelerated by an increase in one of the components of the ray and this with no addition to or subtraction from the elements in the subject.

"But I said we could draw our conclusions afterward. Come, Bruno." He awakened the sleeping dog, who seemed reluctant to stir, and led him to a spot on the floor near the glass cabinet. A word or two and the dog lay down again and in a moment was asleep.

The Colonel swung a long metal arm out from the wall, and after adjusting a clamp, reached into the cabinet for the tubes. Working quickly yet carefully, he soon had them in place and after connecting longer wires to the contacts, stepped toward the bench and threw the

switch. The tubes lighted and he again turned them out, then removed the condensing shutter from the bottom and replaced it with another and larger one. When he had finished, I saw that the apparatus with its larger condenser swung on an arm with its active side over the dog and freely adjustable in any direction.

This time when he threw the switch, the greenish glow appeared in a wide-spread cone, which he carefully narrowed until it just embraced the whole form of the dog. The Colonel adjusted another control and threw the switch that started the stream of reddish sparks down the beam. This time, however, the corruscations were more purple in color, and as he moved the control still more, they changed to the violet of an ordinary Hertzian discharge, glancing down the cone of light like a flood of tiny lightnings. There was also a continuous crackling noise like that from a spark gap and I detected the tingling fragrance of ozone in the air.

AT first the dog gave no sign of effect from the ray but soon he raised his head and seemed to awaken. The Colonel locked the control he had been moving, then stepped to the tube and adjusted the condenser mechanism until the dog lay in the center of a green circle about ten feet in diameter. He lay there quietly, his head raised and his eyes open until the Colonel spoke his name, then he turned to look and finally stood, exactly as if he were giving the Colonel his attention or awaiting a command.

The Colonel walked to the bench and selected a number of objects, a large cork mat, some test tubes and pieces of bent glass tubing. He laid them upon the floor at the edge of the cone of light and spoke to the dog.

"Bruno, bring me the piece of cork."

The animal quietly walked over, picked it up in his mouth and brought it to his master.

"Now bring the long piece of glass with the curve at one end."

There were two pieces of tubing that were both long and bent, but one was curved in the middle and the other twisted into a curve at one end. This proved hard to handle in his mouth but the dog finally secured it and carried it to the Colonel.

"Bruno, go into the library and bring the *small* book on the table."

The dog did so, laying it at the Colonel's feet.

"Now, go back into the library, take my hat from the couch and put it on my chair, then bring the doctor's cane, which is on the desk."

Bruno trotted into the library. We heard him moving about and soon he came in with my stick in his mouth.

"Give it to the doctor."

He moved toward me. "No, handle first and give it to his left hand."

My stick bore a knob upon one end while the other was plain and the dog turned it about and presented it handle foremost to my left side, which happened to be turned away from him.

The Colonel leaned forward and spoke again.

"Bruno, how much are four and three?"

The dog looked puzzled. "All right, scratch on the floor and tell me the answer."

The dog scratched upon the floor seven times, then stood regarding him intently.

The Colonel turned to me. "Ask him to do something, anything simple of which he may have heard the name but something that you may know I have not taught him.

I spoke to the dog. "Bruno, are you afraid of thunder? Move your head in answer as we do."

Emphatically his moved up and down.

"How do you act when you hear music?"

He raised his head and howled.

"Bruno, I brought two bags with me tonight (as I had) and they are on the floor in the library. Bring me the small one."

He trotted out and in a moment came in with my small emergency satchel, placed it at my feet and then lay down in the center of the circle of light.

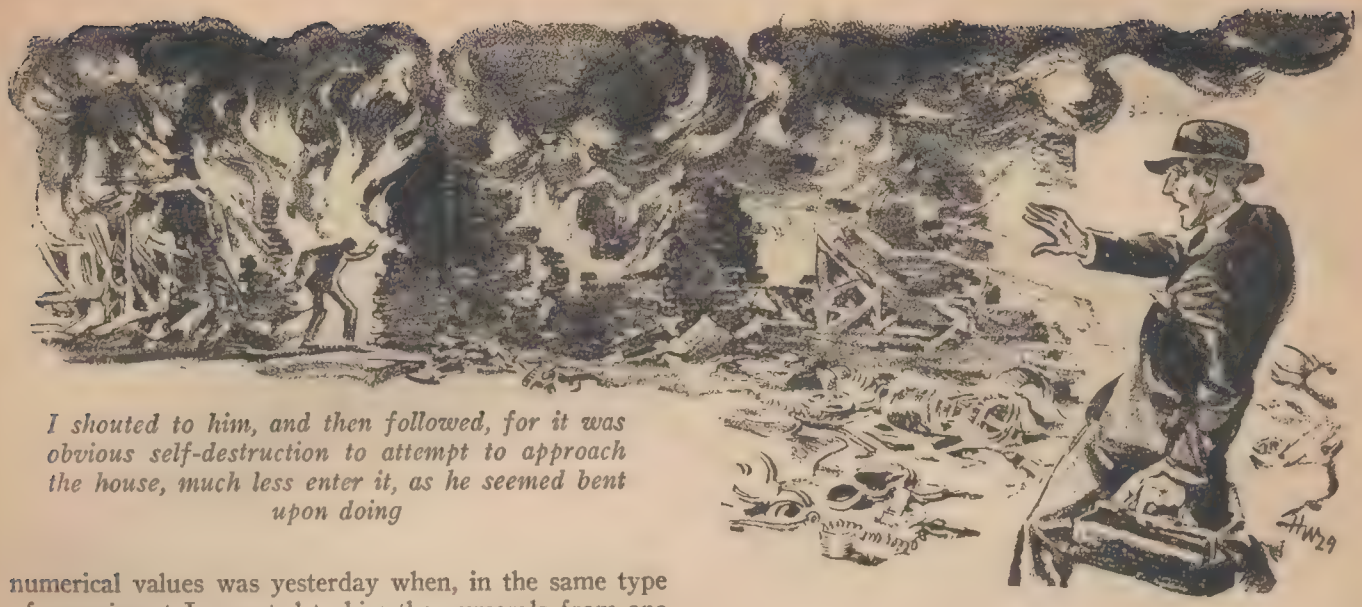
I looked across at the Colonel and saw him sitting on his stool half asleep. I noticed also that I had become fatigued. Looking at my watch I was surprised to find it already two o'clock in the morning and some hours past my usual bed time. I aroused the Colonel and he turned off the machine in unspoken agreement that it was time to suspend our experiments for the night. He turned off the laboratory lights and led the way to the library, leaving the dog quietly sleeping on the floor.

WE both seemed surprisingly tired for the amount of exertion we had undergone, even considering the unusual mental turmoil that the weird experience had occasioned. The Colonel seemed lost in thought, while I relaxed in a chair without energy to propound the questions or advance the suggestions that were clamoring in my mind. The Colonel poured wine for both of us, and under its genial cheer, I felt refreshed.

"You have seen," he said, "that the ray I demonstrated appears to be electrical in character and that it has the power not only to keep an animal in a state of unconsciousness for an indefinite period, but that it also seems to revive the dead when no actual dissolution of tissue has taken place. I may as well say now that this latter phenomenon does not occur unless the proper care as to alkalinization of the tissues and for the prevention of clotting of the blood is taken, hence, my pessimism as to its applicability in human therapy. At first, every dog I tried it upon failed to respond if it had been dead more than three minutes; it was only after I had taken steps after the method of Koch to prevent tissue autolysis that I obtained results over that period.

"However, to return to our subject. The ray, by some process yet to be explained, but which seems to be electrical, affects the nervous system of an animal so that it remains in a state of almost suspended animation and with a variation in its nature causes a nervous system that is extinct as to function, to reassume and enact the characteristics of life. It further causes in a live dog an increase in nervous activity with an attendant increase in cerebration that unquestionably raises the mental power of the animal to an unthought of degree."

"Upon my word, Doctor, the acts you saw the dog perform tonight were not the result of training. Bruno is intelligent and has been my pet for years, but in none of his actions tonight has he ever been rehearsed. When he was sent for the *small* book upon the desk and for a certain one of the optional two of your bags, he did as he was directed, which can only mean that he *understood* the command and exercised the mental power of discrimination. When I sent him to perform two complicated acts in moving the book and bringing your stick, he demonstrated *memory* for two individual commands which is beyond the mental power of an average dog. He deduced an answer to my question of the sum of four and three and the only acquaintance he has had with



I shouted to him, and then followed, for it was obvious self-destruction to attempt to approach the house, much less enter it, as he seemed bent upon doing

numerical values was yesterday when, in the same type of experiment I repeated to him the numerals from one to ten, and illustrated them by blocks of wood.

"In short, Doctor, however incomplete the demonstration has been, I think I have proved to you that my ray has opened a new field of biological research with far-reaching possibilities. Do you realize, man," once more he leaned forward in his earnestness while his eyes held the light of scientific fervor, "what those possibilities are?

"The acceleration of mental function, if successful in animals, can be successful in man. An increase of one hundred per cent only would produce a race of supermen, while, if as I believe, this increase is by way of an increase in the number of synapses or contacts of the ordinarily functioning brain tissue with the vast areas that we know have no demonstrable activity at present, the increase need not be by hundreds but by *thousands* of per cent. Think of the strides that would be made overnight in science, in medicine, in political economy, in morality (which is after all a mental attribute), by the pure effect of such an increase in inductive reasoning power! My friend, do we hold the key to Utopia in my poor machinery in the next room?"

As he finished, the Colonel relaxed in his chair. His enthusiasm seemed in no whit abated, yet he had an air of one suddenly grown tired. His eyes took on a look of infinite weariness, the muscles around his mouth loosened and sagged, even his very skin seemed suddenly grey and wrinkled like one grown old.

My own mind felt dulled. A hundred questions had been milling there and yet when I came to propound them, they seemed suddenly unimportant. I wanted to sleep; the stimulus of the wine was gone and instead of evaluating the Colonel's words and attempting to interpret what I had seen, my thoughts persisted in drifting to a focus upon my bed at home. Physically I was tired too; I felt the innervation, it seemed, of days without rest.

The Colonel's head dropped upon his breast and he seemed almost asleep. Attributing our lethargy to too much excitement, too many impressions at once, and realizing that my impulse to sleep was the correct one to follow, I roused him and saw him make for the couch in the library, then started home. I stumbled as I went out and felt that the distance to my car was endless but I reached it and my house and room without incident. I turned in, as sailors say "all standing" and my last conscious thought before I fell asleep was not of the things I had seen or of the Colonel's words but of the strange fact that we should both so suddenly yield to fatigue.

IT was far past daylight when I awakened, eleven o'clock to be exact, and my weariness of the night was quite gone, although something of a curious feeling of mental dullness remained, not unlike, I must confess, the feeling that sometimes follows overstimulation from alcohol. As I dressed I pondered over the events of the night, but when I reached my office I found a reception room well filled with patients who kept me occupied until mid-afternoon.

Toward the last of them I found it difficult to concentrate. I thought little of the things the Colonel had demonstrated and less of the possibilities in his discovery, but a feeling of fear came over me and grew until I was absolutely unstrung. I know that my last two patients were a pair of highly respectable and elderly neurasthenics, who had been coming in for months and who left quite indignant at my sudden plain and somewhat frank diagnosis of their cases.

They had barely left the office, and since I had no more appointments, I was preparing to leave, when there came a hurried ring and the steps of some one who was starting into my consultation room without waiting for admittance. I opened the door with some displeasure, which vanished when I saw Murphy. His face bore a troubled look and he gave evidence of having run most of the way to my office. In his hand was a sealed letter and he proffered it to me and broke into stumbling speech.

"Please, Doctor, the Colonel says to give this to you, and here it is, but *I* say of myself, please come with me quick. The Colonel has been doing funny things in his laboratory and he doesn't look good at all. There is something wrong; I'm thinking his blasted experiments have led him into a trap and I wish you would come up."

After which, quite out of breath and with a badly worried look on his honest red face, Murphy dropped into a chair and began to fan himself with his cap. I started to open the letter but he broke in:

"Please Doctor, come now, you can read that later and I think we should get to the Colonel right away."

Impressed by his earnestness and perhaps with some-

(*Continued on page 719*)

Cold Light

IT is a rare treat indeed to receive so deeply thought out a story dealing with chemistry and we are glad to pass this treat right on to our many readers who are interested in that science. Enzymes is an excellent subject for illustrating the action of those mysterious chemicals which bring about a reaction without suffering any change themselves.

Man has learned how to harness nature's force of electricity, although he does not know what it is. Why can't he learn the secret of cold light?

The author, professionally specializing in chemistry, has woven an excellent story around this subject. We hope he will give us more soon.

CHAPTER I

The Human Firefly

"A . . . *WHAT?*"

Lem Turner, the village postmaster, dropped the packet of letters which he was sorting and peered quizzically over the tops of his spectacles at the trembling figure before him.

"A face! . . . a head! . . . a man's head," panted the other, "all lighted up and shinin' in the darkness!" He gulped once or twice and essayed to moisten his dry lips with a drier tongue. "Honest now, Lem, I ain't spoofin' you! I saw it starin' at me from behind that elm tree just before you cross the creek!"

The postmaster turned slowly, removed his spectacles with extreme deliberation, and regarded the agitated youth with an eye that reflected ill-disguised pity.

"Do you, William Sheridan," he finally drawled, "think for one moment that I will believe a single word of what you're telling me? Ha—ha! A shinin' face a-gleamin' in the darkness! Why, you've just been seein' things, that's all. Your trouble, my dear friend Bill, is a too dern close acquaintance with that there apple cider of yours. You'd better go a little easy with the stuff, 'cause it might do you a powerful lot of harm. He—he! —a ghost-face a-peekin' out at you from behind a tree! That's rich! Pretty soon you'll be tellin' me about seein' pale green elephants all lit up and a-flyin' through the air, or maybe a hipperpotamouse or two gallavantin' around among the tree tops and shootin' electric sparks from their horns!"

"But I tell you I saw it with my own eyes!" persisted Bill Sheridan, his paled features exhibiting an earnestness that was almost imploring, "and I ain't touched a drop of that cider in three days, too. There was this face not ten feet from me, shinin' with a sort of greenish-blue light, and it came right out from behind that elm and hung there, suspended-like, with its eyes lookin' straight at me. And what eyes!—yellow and sparklin', just like a couple of red-hot coals—and they blinked at me. Ugh!" The very memory of the awful spectacle brought a shudder to the narrator's frame. "And the mouth—it moved and it grinned at me—not a mean kind of a grin, but sort of pleasant and sociable-like, as though intendin' no harm, but just tryin' to be nice and friendly——"

Bill Sheridan paused to catch his breath and wipe the beads of cold sweat that stood out on his ashen forehead.

"And then it slid back around the tree trunk and disappeared—just faded out," he continued, "and I didn't wait to investigate any, but just naturally lit out and wasted no time in puttin' as much ground between me and that there tree as I could! Guess I must of tripped a couple of times," he added ruefully as he gazed down at his dusty and disheveled clothing, meantime nursing a bruised knee that protruded through a jagged tear in his trouser leg.

Postmaster Turner, still scoffing, still skeptical as to Bill's state of sobriety, but impressed by the latter's earnest demeanor and evident sincerity, determined to investigate for himself. Moreover, as Sheriff Turner of Baker County, it behooved him to look keenly into such disturbing and unearthly occurrences as being likely to interfere with the peace and harmony of the little community.

The two emerged into the darkness of a cloudy evening. Bill Sheridan, still trembling from his earlier harrowing experience, was somewhat bolstered up in courage by the physical presence of Lem Turner. The latter, with the knowledge that law and righteousness were on his side, and with the moral and material support of a ponderous six-shooter held in immediate readiness for action, was prepared for any emergency.

Hardly had the two men penetrated a dozen steps into the shadow that blanketed the road like a mantle when Bill came to an abrupt halt and gripped the sheriff's arm, trembling.

"Look!" he gasped. "There, to the right!—just over that hedge! See it?—the face—the head—all lit up and shiny!"

The otherwise indomitable minion of the law stood rooted in unconcealed terror at the strange apparition

David L. Fox

By

William Lemkin, Ph.D.

that presented itself to his unbelieving eyes. From over the top of the hedge there slowly rose a luminous face, as weird and ghostlike a spectacle as ever met the horrified gaze of human eye. It was normal in size, a perfect human face and head, with kindly eyes and smiling, far from unpleasant lips. The skin radiated a pale-green phosphorescence, and the eyes were, as Bill Sheridan had described them, shining forth like glowing coals of fire, with a piercing yellow gleam.

Illustrated by McGERR

For fully a minute the two adventurers stood transfixed—every muscle taut and paralyzed. They stared in open-mouthed amazement at the superhuman spectacle.

FOR fully a minute the two adventurers stood transfixed—rooted to the spot—every muscle taut and paralyzed. They stared in open-mouthed, open-eyed amazement at the superhuman spectacle, while the luminous face stared back with a fixed and unflinching gaze. Then, like a flash, it was gone! It did not slide down again behind the protective shadow of the hedge, whence it had so mysteriously risen. Neither did it move to the right nor to the left. It simply *went out*, just as an electric light bulb is snapped off by a turn of the switch.

Bill Sheridan, having been treated to a similar visitation less than a half hour previously, was the first to emerge from the state of suspended animation into which the sudden apparition had flung them.

"Quick, Lem!—the gun—shoot!" he whispered hoarsely into his companion's ear. The officer, roused out of his stupor, became the picture of action, brandishing his weapon and prancing about with extreme agitation. But what to shoot? where to shoot? How can one, no matter how well-meaning his intentions may be, shoot at an invisible target? Lem Turner peered about in all directions, but the enveloping blackness was unbroken, except for an occasional flash and twinkle of light, as a firefly flitted past. The mysterious, luminous face was nowhere to be seen.

"There you are now—as plain as day!" whispered Bill, casting furtive glances into the surrounding gloom. "I wasn't foolin' neither, was I, Lem? That's just the way it looked over by that elm tree, only the other time it didn't disappear so suddenly, like it did right here. What do you think it is, Lem? Shall we go and chase it out into the open? Maybe we'd better get the rest of the force first."

"Darned if I can make out this whole business," mused Turner, scratching his head thoughtfully and nervously toying with his gun. "That don't look like a ghost, at least from what I've heard say about them. Somebody might be up to some practical joke maybe or else . . ."

A crunching sound as of a footstep behind them froze the words in the speaker's throat. They both wheeled swiftly, to be met by the same startling vision that had appeared over the hedge just a few minutes before. The luminous face appeared to be suspended at about the level of their eyes and was no more than five feet distant from them. The greenish phosphorescence that characterized its previous appearance was now gone. Instead, the mysterious visage gleamed forth with a pure, blue-white light. Every feature of the face was vividly delineated, the high forehead, the eyes of penetrating yellow fire, the long aquiline nose, the thin, half-parted lips and the firm chin.

The supernatural apparition drew closer, seemingly floating through the darkness as though with the aid of invisible wires. It was now a bare two feet away from the men, who once again had been paralyzed into immobility by the fearsome sight. The glowing lips parted into a smile. Then suddenly a luminous hand emerged out of the gloom—a thin, bony hand that emitted the same bluish-white light as the face—and gently touched Lem Turner's arm.

"Gentlemen—I beg your par——!"

The touch of the ghostlike hand and the sound of the hollow, sepulchral tones that came forth from the luminous cavity that represented the mouth of the face served to break the spell into which the two horrified spectators had been cast. Galvanized into violent action once again, Turner sprang a step to the rear and bellowed:

"Stand back there!—be you ghost or man or whatever you are!—I'm goin' to *shoot!*"

Quick as a flash the luminous apparition was gone—face, hand and all. Then "bang! bang! bang!"—the sheriff's trusty weapon barked into the night. The sound of hurried footsteps retreated down the road and the officer emptied his gun in their direction.

The roar of this unusual cannonading brought the excited populace pell-mell out of their homes, to form an agitated group in the roadway, all gesticulating and inquiring at once. Lem Turner and Bill Sheridan, being the only eye-witnesses of the astonishing visitation, were besieged with questions. A luminous face? What business did such an unearthly thing have, prowling around those peaceful parts? The puzzled citizenry shook their heads in bewilderment and assisted in scouring the immediate vicinity with lanterns and torches in the hope of scaring the inhuman being, whatever it was, out into the open. They beat the thicket in all directions, flashed their lights behind the bushes and into every possible hiding place and even up into the branches of all trees in the neighborhood, but the hunt was fruitless. The mysterious night prowler, whether human or supernatural, had effected a clean escape.

Not a single soul in the village of Bakersville slept a wink that night. Everyone was on the *qui vive* for a possible reappearance of this strange marauder. But the luminous face did not make itself visible again for the remainder of the night. The following evening, however, the Widow Galey was terrified almost into insensibility by the sudden flashing of the same glowing face at her kitchen window. An hour or so later the Phillips' hired man stumbled precipitously into the living room of the farmhouse with his face bearing a death-like pallor, his teeth chattering and his eyes rolling wildly. Between gasps he reported having seen the horrifying spectacle of a human head and torso, all ablaze in a lurid brilliance, moving rapidly down the road. The shoulders, chest and back were bare and gleamed brightly in the darkness of the road. The luminous arms swung briskly and the entire torso, ending abruptly at the waistline, jogged along the highway, suspended above the ground at just about the normal height of a human body.

FEELING was now beginning to run high in Bakersville at this mystifying spectre. It was true that, so far, it had caused no material damage to anyone in the village. Outside of scaring a few of the good village folk half out of their wits, the bold visitor had demonstrated himself as totally innocuous. But what did this all mean? What was the explanation for such unearthly doings? Many were the theories and conjectures expounded and debated in the attempt to solve the puzzle. Butler, the village pharmacist, was of the opinion that some practical joker was making ingenious use of luminous paint and was enjoying a good laugh at the expense of the terrorized populace.

"Just some calcium or zinc sulphide," he argued, "is all that's necessary to make a good luminous paint that'll shine in the dark. Or else he's using some of the stuff they put on those so-called 'radium' watch dials."

But whoever heard of luminous paint or radium dial compounds that shone forth with such dazzling brilliance as demonstrated in the later appearances of this light-emitting visitor? Moreover, how would you then account for the instantaneous extinguishing of the mysterious luminosity, as attested by the several eye-witnesses? And

then again, there was the matter of the piercing eyes like glowing coals, that blinked in the most lifelike fashion. Certainly it was something more than luminous paint.

Others in the village, who professed a semi-scientific turn of mind, brought forth different hypotheses. Some thought that the luminosity of this strange character was a phenomenon akin to the phosphorescent glowing of damp wood in a forest. Some scamp, they argued, was employing an extract or derivative from damp wood, with which extract he coated his body in order to have some innocent fun with the inhabitants of the vicinity. A few scoffers opined that the whole scheme was an advertising stunt to gain publicity for some new cigarette, and thus pave the way for a huge selling campaign in the countryside. A half dozen of the more religiously inclined members of the community insisted that it was a sign from heaven, a mystic symbol or warning to a sinning world that the Day of Judgment was close at hand.

The luminous visitor continued to appear from time to time in various parts of the vicinity. Now he would emerge as merely a glowing face flitting through the shrubbery along a dark road or coursing in and out among the trees. Then he would be reported as patroling an unfrequented region among the nearby hills, stripped to the waist, with half his body glowing brightly. On one occasion, two boys, skirting the mill pond one dark, sultry night, were startled to see the luminous stranger disporting himself in the cool waters, his entire body glowing with a brilliant sheen that was reflected in myriad ripples of luminescence as he dived and splashed. His sole garment, so the boys reported, appeared to be a diminutive pair of dark bathing trunks which seemed almost invisible in contrast with the blinding brilliance of the rest of his body. The awed spectators of this remarkable performance remained concealed as long as they dared and then fled in a panic as he approached their hiding place.

Reports of the unearthly happenings about Bakersville spread far and wide. News reporters and editorial writers devoted considerable space to the exploits of the mysterious visitor. Although he confined his luminous visitations to only a narrow locality, his fame extended to the remotest parts of the land. The "Human Firefly" was the appellation given to him by those who witnessed his recurring appearances. The title was a singularly appropriate one, for like a firefly he would suddenly burst into a blaze of light and then flash off again as by the pressing of a magic switch. People spoke in awed whispers about him, and many a fearful glance was cast over many a shoulder as a hunched figure hastened down a lonely road or through a deserted street after dark.

CHAPTER II

The "Colite Luminor"

WHEN young Walter Graham entered Dr. Hament's laboratory as general assistant, it was with a feeling of profound admiration for the remarkable scientist and deep fascination for the absorbing problem with which his giant intellect was struggling.

Arthur T. Hament, Ph.D.!—the very name engendered a magical awe in the heart of the young assistant. *There* was a name to conjure with! And the problem—*cold light!*—the dream of modern science was now, after those three years of ceaseless and painstaking experimentation, on the very verge of realization. Up there in the little laboratory that perched on the hilltop just outside the village of Bakersville the secret of the firefly and the glow-worm was slowly being wrested from reluctant nature to be put to practical use by mankind.

Walter carefully set down the flask of fluorescent liquid, turned off the pet-cock that was bubbling a steady stream of gas through the apparatus and sauntered over to the open window that admitted the refreshing breeze of a midsummer evening. He was in a ruminative frame of mind, something of extreme rarity in those crowded days and nights of assiduous experimenting and testing and observation and planning. Busy months they had been, months of unparalleled absorption in the profound problem. Of setbacks there had been many and discouragements galore, but ever the two workers—the indomitable scientist and his eager assistant—had plunged onward in the struggle for the precious secret. Now it was almost within reach.

Walter gazed dreamily out upon the shadowy landscape, dotted here and there with the intermittent flashings of innumerable fireflies as they flitted in and out through the warm atmosphere. He smiled to himself as he thought of how green and inexperienced he had been when first he joined forces with Dr. Hament in his inspiring task.

Man, he thought, might well pride himself upon his development of heat, light and electricity, upon which present-day comfort is so largely dependent. Should these modern wonders suddenly disappear, their absence would be sorely missed. But, reflected the young scientist, methods of producing heat, light and electricity have long been possessed by living creatures, which have equipment far different from man's crude furnace, lamp or dynamo. And crude they were indeed, young Graham pondered, and smiled inwardly at the thought of how poorly man's devices compare with the ingenious mechanisms found in nature. In the matter of heat production, mammals and birds maintain their body temperature continually above that of their surroundings. By the oxidation of food in their tissues they may be said to possess eternal fires, and their efficient system of thermoregulation makes them independent of cold. Several forms of marine life, such as the electric fish, young Graham mused, can generate a considerable current of electricity, sufficient even to ring a bell or light an incandescent lamp.

But it was in the field of bioluminescence, the production of light by living organisms, where Graham's thoughts lingered fondly. That was the work to which his chief and idol, Dr. Hament, had devoted his life, the work which held out so much inspiration and promise to the young scientist. Walter smiled at the memory of the first time when he viewed the remarkable phenomenon of the phosphorescence or "burning of the sea"—the water a vivid sheet of flame when disturbed by a passing ship.

"That," Dr. Hament had explained to him at the time, "is one of the most interesting examples of bioluminescence. Some very fantastic theories have been advanced to account for this strange occurrence. At one time the belief was held that the light owed its origin to putrefaction, because it has been known that dead matter might, under certain conditions, become luminous. Others were of the opinion that it was due to the presence of the element phosphorus in sea water, which glowed in the dark, as it used to glow on the head of an old time match. One scientist conjectured that the sur-

face of the sea imbibed light during the day time, which it later discharged, much like a luminous paint made with a mineral such as calcium sulphide. Others believed that the light of the sea was electric, because it was excited by friction. But all of these theories are now obsolete. It has been established beyond doubt that the phosphorescence of the sea is due to animals living in it—most of them microscopic in size, as the *dinoflagellates* or *noctiluca,* but many visible to the naked eye, such as the comb jelly-fish (*Ctenophores*)."

WALTER had marveled at the old scientist's vast fund of information, but had been elevated to supreme heights of admiration when he first initiated him into the mystery of the firefly, and its method of cold light production.

"Very few people," Dr. Hament had informed him, "realize how many luminiscent organisms there are. A survey of the animal kingdom reveals at least forty different orders containing one or more forms known to produce light. In addition, at least two groups of plants are luminscent, the fungi, which produce the phosphorescence of damp wood, and the bacteria, which cause dead meat or fish and other dead organic matter to give off light."

The flitting sparks that denoted the tiny fireflies circled and flashed through the impenetrable darkness without. The young experimenter tried to follow each evanescent flash, and laughed to himself at his foolishness. How vividly he remembered Dr. Hament's careful dissection of this marvelous little insect, and his lucid exposition of how it produced its mysterious cold light.

"Here, Walter, look," the old scientist had said, indicating the specimen under the enlarging glass. "There is the common firefly, which, strictly speaking, is not a fly at all, but a beetle, belonging to the family *Lampyridae,* genera *Photinus.* Notice that the photogenic organ of the insect is located in the lower part of the abdomen and consists of this ventral mass of large cells where the luminescence originates, and directly behind another layer of small cells which acts as the reflector. Observe these large tracheal trunks or air tubes which pass into the light organ and branch out into every cell. These tubes give an abundant supply of oxygen to the photogenic organ. Note also those white thread-like branches, which are the nerves that control the luminescence. The thick tube supplying the light-producing cells increases the flow of oxygen and the light is intensified; the same air tube, swayed by the insect's will, slackens or even suspends the passage of air, and the light grows fainter, or even goes out. It is, in short, the mechanism of a lamp which is regulated by the access of air to the wick."

Walter recalled with a thrill the zealous gleam in Dr. Hament's eyes as he led to the topic that was closest to his heart. "And there," were the tense words of the old scientist, "lies the secret of cold light, that remarkably efficient luminescence of which the firefly is master, and which, when made available for the use of mankind, will revolutionize the field of illumination! That, my boy, is our great problem. I have already done a good deal of the preliminary work, but the problem is still far from a satisfactory solution. With your great help and cooperation, with the benefit of your youthful vigor and imagination, coupled with your keen scientific insight, I am certain that we shall be able soon to present to a startled and appreciative world the wonderful secret of cold light."

Standing there now by the open window of the laboratory, young Graham could not control the flush of embarrassment that rose to his cheeks at the mere memory of those impressive words, just as it mounted and overwhelmed him in a stammering and incoherent confusion of speech on that occasion more than three years ago. With vigorous determination, and a wealth of enthusiasm the two had plunged into an interminable series of researches, involving the minutest detail and exactness of procedure. They had gone deep into the field of morphology, studying the form and arrangements of the structures possessed by plants and animals, in investigating the cause of their luminescence. They had pored over volumes on entymology, digging out bit by bit the secrets of luminous insects. They had delved into the intricate chemistry of the light-producing medium, engaging in a vast number of patient analyses and equally painstaking syntheses. They had invaded the domain of the physicist in the study of the nature of bioluminescence and its physical measurements. They had penetrated the field of the illumination engineer in a minute study of light control and light efficiency. Many of their experiments had ended in failure. Frequently, after a long and tedious series of steps, involving work of the minutest detail, they had found themselves figuratively facing a blank wall. After such a heartbreaking climax, they would be compelled to retrace their steps, and laboriously commence on a different tack. Long and arduous had the battle been, and now victory was just around the corner.

Walter's revery was broken by a footstep at the door of the laboratory. Dr. Hament entered and sank wearily into a chair.

"The Human Firefly!" he laughed half to himself. "That's not such a bad appellation, is it Walter? But it's getting to be a dangerous business, what with people shooting at me, and one thing or another. I believe, however, that the last injection of *alpha-luciferin* was the best so far. My control of oxidation was beautiful, almost as efficient as the original firefly itself. There's none of that infernal lag which troubled us so at the beginning of our experiments with these subcutaneous injections. And as for the brilliance of illumination, I am confident that the comparison will make that ambitious little insect hide its head in shame."

"And you think," asked his youthful assistant eagerly, "that the three amino groups are now in their correct position in the compound? I was working all afternoon on the preparations for another synthesis run, to bring the groups in the 1:2:7 positions, and swing the third hydroxyl back to its old place near the end of the secondary carbon chain."

"No, my boy," replied Dr. Hament, "I believe we now have the alpha-luciferin structure definitely fixed in its final form. We've got the problem just where we want it, Walter," and with a merry laugh and an affectionate hug, "we have now reached the point where we are going to *'out-glow'* the glow-worm!"

"Judging from what I have heard about the neighborhood," smiled Graham, "and from the reports in all the newspapers in this part of the state, you have created a tremendous furore with your mystifying luminescent appearances."

"To be sure I have kicked up a considerable rumpus in these parts," returned Dr. Hament with an amused twinkle in his eyes, "and maybe I've put more of a scare into the simple village folk than I really ought to have. I can see where this vital information which we have in

our possession would, in the hands of an individual with malicious intentions, be a powerful influence for evil. However, as I have already explained to you, my purpose has been to synthesize the photogenic material that was responsible for the firefly's luminescence, study its physical and chemical properties, and determine the conditions under which it may be put to a practical use in the solution of the problem of cold light. Of course, Walter, human luminescence, as we have succeeded in perfecting it, can have no real practical significance. And yet, outside of being a curious and an exceedingly romantic phenomenon, it has served a useful purpose in enabling us to garner a wealth of valuable information as to the mechanism of the firefly's luminosity. Some day, perhaps after our main problem is solved, we'll come back and play around in this interesting field of human luminescence. I am confident that we shall discover some means of prolonging the virility of the alpha-luciferin injection beyond its present short life of only a few hours. There is one undeniable benefit, however, which will accrue to our cause by virtue of my nightly prowlings about the neighborhood.

"There is no gainsaying that the populace is now definitely aroused to a high pitch of excitement and expectancy in this matter.

"The subject of the firefly and luminescence in general has taken a tremendous hold on the popular fancy and curiosity.

"Can't you see, my boy, how the widespread publicity has paved the way for the momentous occasion when we shall present our valuable work to the world? It has constituted an advance herald, or a press-agent, if you will, for the real presentation of our cold light which will be effected in a short time."

"True enough, Dr. Hament," replied young Graham, "and oh, what a shock those illumination experts will get when we spring the *Hament Colite Luminor* on them!" He pointed to the apparatus on the work-bench, elaborate to a bewildering degree, but showing in all the labyrinth of tubing, bulbs and electrical devices a neatness of design, and a precision of construction that denoted the touch of an experienced experimenter. "I've been varying the oxygen concentration in the last few runs, and I'm beginning to get a much smaller proportion of the red end of the spectrum, and a definite shift up toward the blues. A little further investigation along those lines, with a few more tests on the concentration of the catalyst, and I believe the problem is solved. That is," he added with a smile and a glance at the complex apparatus set up before them, "after we simplify the mechanism to the point where it may be regarded as being on a practical basis."

"Simplification," answered the old scientist as he scanned the elaborate device affectionately, "is the last and easiest part of our task. In a short time, my dear boy, the world will be startled by these revelations and industry will be completely revolutionized."

Apparently heedless of the late hour, the two workers plunged into their work as though the day had just commenced. The first streaks of dawn still saw them busily engaged in weighing out accurate quantities of mysterious gray powders, removing, shortening, readjusting rubber and glass tubes, carefully counting globules of gas bubbling through tall cylinders filled with strangely colored luminous liquids, and poring over reams of paper covered with mathematical calculations and intricate chemical formulas.

CHAPTER III

The Conference

"WHEN did that fool inventor say he was coming?" growled the president, chewing savagely on an unlit cigar, and scowling at the remainder of the group in the room. As chief executive of the powerful International Illumination Corporation, Theodore F. Joyce had always been in the habit of scowling and growling as a means of exercising his authority.

"He ought to be here any minute now," vouchsafed Corway, research chief of the vast enterprise. Although his air was one of complete respect and subservience, one could note a flash of nervousness and impatience in his demeanor. The ordeal of waiting was evidently a trying one, even to a man of his steely nerves.

"There's no doubt about it," put in Evans, manager in charge of North American production, "that his whole scheme will prove to be a grand flop." He fidgeted with a paper weight, and almost dropped it in his agitation.

It was obvious that the men, a dozen or so in number gathered there in the luxurious inner sanctum of the corporation's New York office, were in a high state of nervous excitement. They squirmed and shuffled, and whispered among themselves in hoarse tones.

President Joyce strode to the window and gazed gloomily out at the forest of skyscrapers, and beyond them to the dimly outlined Palisades far off across the broad Hudson. His dark brow knit itself into a vicious frown, and his small, fox-like eyes roved fitfully over the sun-bathed temples of finance and industry, as though searching there for a solution to the perplexing dilemma that confronted them.

"I tell you, man, we've got to stop this lunatic!" he thundered, wheeling suddenly and bringing his clenched fist down upon the glass-topped mahogany directors' table with such violence that inkwells rattled and papers flew in all directions. "If we don't, we'll be paupers tomorrow!" He glared menacingly at the group, and shook a threatening finger at them. "That guy Hament has something there which can't be laughed down so easily. There's no use in trying to fool ourselves on that point. We've got to quit acting like a lot of ostriches with our heads stuck in the sand, and face this situation squarely. From what I've been able to gather regarding this man's invention it seems pretty certain that he really has hit upon the secret of cold light. And if his idea is at all practicable, then he is in a position to revolutionize the entire world industry of illumination. With a little financial backing, which he can most certainly get without any great trouble, he will stand the lighting business on its head, and reduce our hundred billion dollar corporation to the point where it wouldn't command the proverbial thirty cents in the open market."

Joyce snapped his bulldog jaw with a resounding click to drive home his last point, and glared darkly at the silent and motionless group about him.

Research Chief Corway bit thoughtfully at the end of a pencil and drummed the table top with his fingertips. "I'm not so sure but what we're inclined to give this fellow Hament a little too much credit. I think that we're jumping a bit too hastily at conclusions regarding his solution of the problem of cold light. From our experiments and investigations on this question conducted in our research laboratories over a period of years, we have

learned enough about cold light to realize that it will never have any practical or commercial possibilities. True enough it is found distributed in nature pretty largely, but man cannot hope ever to convert it to his own material use. In the course of our work we have discovered obstacles and difficulties that are completely insurmountable. I am convinced that Hament is far from the correct solution, and never hopes to reach it. He is probably a slick publicity seeker with a personal axe of some sort to grind."

"I'm inclined to believe," remarked Cobbett, Chairman of the Board of Directors of the International, "that all the reports concerning Hament's invention have been materially exaggerated. I am thoroughly familiar with the work of our research staffs on the solution of the cold light problem, and I agree with Corway that no amount of human ingenuity and inventive genius is capable of converting the firefly's secret into practical usefulness. As a scientific curiosity it is an interesting and noteworthy phenomenon, but beyond——" Cobbett shook his head dubiously and continued with a meditative air to fold and unfold a sheet of memorandum paper.

THE irate President continued his impatient tramping up and down the long executive chamber, his hands clasped behind him, his huge back humped, and his dark eyes scowling furiously.

"Research staffs!—bah!" he roared, stopping peremptorily and facing Corway. "A fine lot of idiots you've been able to gather under your *expert scientific direction.*" The sarcasm was caustic and biting. Corway winced in the face of the scathing assault. "Working day and night, burning up hundreds of thousands every year, employing the finest of facilities and equipment, and what have you and your superb staffs accomplished? Nothing more than to demonstrate how thoroughly an obscure and impoverished individual, possessing some real imagination and horse sense can lick you to a complete standstill. Bosh!"—and Joyce spat derisively—"if I had had my way, your entire crowd of fancy and high-priced scientific research talent would have been thrown out long ago!

"However," he snapped tersely, "there is no time for crying now. It's up to us to stop this fellow Hament before we find ourselves out in the cold. If he shows us that he really has something worth while, then we've got to get hold of that invention of his. And," added Joyce with significant import in the tone of his voice, "if he refuses to listen to reason, then we'll have to use stronger means. That device won't be safe except right in our own possession!"

A knock at the door heralded the coming of a secretary with the news that Dr. Hament had arrived. The old scientist entered accompanied by Walter Graham. The young assistant carried a black bag which he carefully set down on the table. Dr. Hament smiled his greetings to the group seated or standing about the room. Even if he sensed the uninviting coldness of his audience, and the feeling of electrified tenseness in the atmosphere, he showed no sign to indicate it. His manner was pleasant and entirely cordial as he shook hands with President Joyce.

While young Graham busied himself with the black bag and its mysterious contents, the inventor faced the circle of expectant listeners.

"I presume, gentlemen, that you are all acquainted with the object of my mission," he began. "My telegram, I believe, made that perfectly clear. I have brought with me a small working model of the 'Colite Luminor,' which my assistant is now setting up for demonstration purposes. I am confident, when you see its remarkable performance, that you will be overwhelmed with the stupendous possibilities of cold light in the field of world illumination."

Stolid and silent remained the group of powerful executives. Dr. Hament scanned the immobile and inscrutable faces in a half-circle before him, cast a glance at Graham, occupied in setting up a queer tripod-like apparatus on the table, and continued:

"I ask your indulgence, gentlemen, while I start my explanation of the 'Colite' principle from the most elementary beginnings. I realize that I have before me some of the most expert technical brains of the illumination field, and that part of what I tell you now will be to some of you of the most rudimentary simplicity. Yet it is essential that I make my exposition complete in order that you may obtain a comprehensive understanding of my invention.

"According to modern physical theory, light is regarded as a succession of wave pulses in the ether. The ordinary forms of light, such as sunlight, electric light, gas light, etc., are due to phenomena associated with the high temperature of the light-producing medium. Every solid body above the temperature of absolute zero is giving off waves of different wave length frequency, and this emanation is known as radiant energy or radiant flux.

"As you all know, the long waves given off in largest amount from objects at comparatively low temperatures cause the sensation of warmth. As we raise the temperature, in addition to these longer heat waves, those of shorter and shorter wave-length are given off in sufficient quantity to be detected. At about 525°C, the rays of short wave-length are just visible as a faint red glow to the eye. As the temperature is increased, still shorter wave-lengths become apparent, and the light progresses through the stages of dark red, cherry red, dark yellow, bright yellow, white-hot and blue-white, which is attained at temperatures above 1400°C. Our sun and the other stars in the universe, being at temperatures of about 5000° and higher, emit a pure white light, a mixture of all wave lengths. This means of producing light, namely by *incandescence,* is so universal and so easy that it is no wonder mankind has adopted it. Practically every illuminant today is patterned after the sun and stars. We heat an incandescent lamp filament to the highest temperature possible without volatilizing the filament. It is not possible to reach the temperature of the sun, but 2000°C is attainable, and a considerable percentage of the electrical energy which heats the filament is radiated as light and heat.

"You will agree with me, gentlemen, that there is a most unfortunate and deplorable divergence between the amount of energy radiated as heat and the amount sent off in the form of light. The former is fully 98% of the total radiation, while the latter is only about 2%. If the useless heat radiation could be eliminated, a two horsepower engine might run the dynamo to supply our lights that now require 100 horse-power. Incandescence is a wasteful way of producing light because it is impossible to separate the heat radiation from the visible light radiation.

"However, we know of many cases where substances produce light at temperatures much below 525°C. In these instances, the light emission is stimulated by some

other means than heat. We speak of such bodies as giving off *luminescence* or cold light. The spectrum of a luminescent object lies wholly in the visible region, with no infra-red or ultra-violet. As far as radiation goes, it is all light, or 100% efficient.

"IT IS needless for me to make more than a passing reference to the various examples of luminescence, other than the particular variety in which we are here most interested, namely *bioluminescence* or the production of cold light by living organisms, such as the firefly. There is, for example, the luminescence which appears in a vacuum tube when an electric current is passed through, spoken of as *electroluminescence.*

"Then we have the various phenomena of *phosphorescence,* which, although the term has been used in a very loose way to indicate all kinds of luminescence, and particularly that of phosphorous or luminous animals, has, to the physicist, a very definite meaning, namely the absorption of radiant energy by substances which afterwards give this off as light. The best known cases of such light emitting substances are the sulphides of barium, calcium, strontium and zinc, prepared by heating to a high temperature, as sulphides prepared in the wet way give no light, all commonly used in the manufacture of luminous paint. If the material gives off light only during the time it is radiated, but does not persist after the excitation, then we speak of *fluorescence.* As the name implies, *chemiluminescence* is the production of light during a chemical reaction at low temperatures. This phenomenon should rather be called *oxyluminescence* because practically all examples of such light production involve oxidation reactions. The glow of phosphorus is the best known case, but other elements will also glow in the dark, particularly freshly cut sodium and potassium metals.

"The spectra of luminous animals are quite similar to those of chemiluminescent reactions. Moreover, as we have seen, chemiluminescence is essentially an oxyluminescence, since oxygen is necessary for the reaction. All luminous animals also require oxygen for light production. Therefore, bioluminescence and chemiluminescence are similar phenomena, and they differ from all the other forms of luminescence which I have considered. The light from the firefly is due to the oxidation of some substance produced in its cells, and once the structural formula of this photogenic substance is written, and the mechanics of this oxidation process is revealed, then the problem of cold light is solved.

"Two experiments both performed early in the history of bioluminescence, are of great importance in understanding the nature of animal light. The eminent English physicist, Robert Boyle, in 1667, proved that air is necessary for the organism to give off light. He exhausted the air from around a piece of phosphorescent wood and the light disappeared; when he readmitted the air, the light returned. In 1794 the Italian scientist, Spallanzani, discovered that all luminescence required water, and he showed that he could take any light-producing animal and dry it and the light would disappear, but that if he kept this dried material and at some later time moistened it again, the light would reappear. In fact I have kept dried fireflies for ten years and observed a bright light whenever they were moistened.

"Since water and oxygen are necessary, it is evident that some material produced by the cells of the animal is oxidized, and this material is called, to use a general term, the *photogen* (light generator), but to use a more specific term, it is called *luciferin.* In a strict sense, we should speak of *luciferins,* because there are as many such materials as there are types of luminous animals, and each luciferin is specific for that particular variety of living organism.

"Finally we may ask the question: What happens when luciferin is oxidized? Is it converted into carbon dioxide and water, as are sugar and fat in our body? Experiment has shown that no carbon dioxide is produced from the luminescence of a firefly. This is therefore no ordinary oxidation process. Considerable research on this phase of the work has revealed that the oxidation product is a new material which may be termed *oxy-luciferin,* following a nomenclature similar to the one used for *hemoglobin,* the red pigment of our blood. When this latter substance is shaken with air, it becomes *oxy-hemoglobin.* If we now place the new product under an airpump and exhaust all the air, it returns to the original hemoglobin. This process is reversible and will go either one way or the other, depending upon the amount of oxygen present. Luciferin behaves in a somewhat similar way, although the regeneration is not effected in so simple a manner. When a firefly flashes, it oxidizes its luciferin to oxy-luciferin. When it is resting in the dark between flashes, the oxy-luciferin is reduced back to luciferin, and the firefly is ready for another flash. In other words, this animal may be regarded as a lamp which burns an 'oil' and after that 'oil' has been burned it is reformed, and is ready to be reburned. We have the process of oxidation and reduction simply going back and forth according to the amount of oxygen present.

"It is in the study of luciferin that most of the work on cold light has been done. Chemically it is a protein substance, highly complex in structure, and its synthesis has been the great stumbling block in this research. However, chemists now synthesize the fats and sugars, so that they are absolutely identical with the corresponding compounds built up organically by the living cell. Moreover, we have even succeeded in synthesizing some of the simpler polypeptides, the intermediate stages in the formation of the proteins. My own humble efforts in this field of chemical experimentation have been crowned with good fortune and ultimate success. I have pieced together the structural formulas of a large number of the luciferins, and have synthesized them at will and in large quantities.

"MORE than that, gentlemen, I have even improved on nature, if I may be pardoned for uttering so blasphemous a statement. I have effected certain minor, though significant rearrangements, in the molecular configuration of the protein, producing some brand new luciferins that are found in none of the known luminous organisms. Several of them have proved to possess some remarkable properties. For instance, one has been found suitable for injection into the blood stream of other animals, and by an automatic oxidation in the tiny capillaries at the surface of the body it gives the animal a striking luminescence. I have even gone so far as to develop a human luciferin, with which I have produced some startling results. Perhaps you have already heard of the 'Human Firefly,' and I think you will now have no difficulty in fathoming this apparently mysterious phenomenon.

"However, my object, throughout all of this gigantic

research, was fixed and definite. The ultimate aim of the entire work was to devise a lamp in which luciferin is burned continuously over and over again, without the aid of any life processes. In one region luciferin is oxidized to oxy-luciferin to yield a bright, pure-white luminescence; in another part the oxy-luciferin is reduced to luciferin again. Such is the principle of the ideal lamp to imitate and improve upon the work of the lowly firefly. I am happy to inform you, gentlemen, that before you stands the very embodiment of that principle—the 'Hament Colite Luminor'!"

Throughout this lengthy recital the assembled audience paid keen attention to the words of the scientist. Although their attitude was unmistakably hostile, these powerful moguls of the illumination world could not help but be impressed by the inspiring magnetism of the lecturer's manner. To the technical experts in the group much of Dr. Hament's preliminary explanation was of a very familiar nature. To all those present the remarkable significance of his own personal researches and final triumph as he described them were sufficient to engender a feeling of high respect. Yet, the general attitude of animosity could not be downed in spite of that feeling.

While his chief was expounding the underlying principles of cold light, young Graham had been occupied in assembling on the table a curious contrivance that, in general appearance, bore a striking resemblance to an old-fashioned parlor kerosene lamp. Standing about eighteen inches when lit, it consisted of a round barrel-shaped body, supported on a metal tripod, and surmounted by a large spherical globe of some creamy-white, glass-like material. The body of this queer lamp had a small hinged cover located off to one side and near the top which ostensibly could be opened up to reveal the internal mechanism. A number of slender brass tubes projected out of the body at various points on its surface, only to bend back and re-enter the apparatus at different places. Several adjusting knobs and buttons were located near the bottom, as was also a small meter-like devise, similar to a steam pressure gauge on a boiler. The model was equipped with a tiny electric motor situated at the very base of the body, and encompassed by the three supporting legs. A flexible electric cord made contact with an outlet conveniently situated in the baseboard near the table. The entire device standing there in the semi-circle of doubting and incredulous eyes, made a rather startling appearance. Certainly it was like nothing that any of those present had ever seen before.

The president of the International opened with the first gun in the fiery barrage of doubt and aspersion. "What you have so carefully outlined to us, my dear professor," said Joyce, insinuatingly, "may be very true—all of it—but even before you turn on this pretty magic lantern toy of yours, how do we know that there is nothing crooked about it? Now I see you're going to employ the electric current for running your lamp. Isn't that exactly the underlying basis of modern illumination and hasn't it been since the day when Thomas A. Edison demonstrated the first incandescent electric bulb?"

The old inventor smiled wearily and opened his mouth for an explanation, when the second howitzer of the bombardment let loose. A curt question regarding a minor point was sprung by one individual, and before Dr. Hament could make satisfactory reply, the storm broke in the form of a wave of quibbling and hair-splitting queries and comments that left the old man flushed and shaken. He leaned back limply against the table, surveying the group about him with much the same feeling, perhaps, as a lamb regarding the circle of hungry wolves that is closing in about him.

"And besides," blurted out Cobbett, the research chief, "you are not telling us anything new. Our experimental staffs have made an exhaustive investigation into the entire problem of the firefly's luminescence. Working in absolute secrecy, of course, we have developed a score of luciferins and determined their chemical and physical properties. More than that, we have anticipated your alleged discovery of a method for oxidizing the photogenic material outside of the living organism. In fact, our own special lamp for effecting this continuous and reversible operation is already being constructed and will soon be demonstrated publicly. Therefore, Dr. Hament, with all due regard for your wonderful discoveries, I am afraid that you are a little too late. Still, we shall be pleased to have you show us how your device operates. It surely can do no harm for us to witness a demonstration."

THE inventor had now regained his former composure and equanimity. A smile of mingled pity and scorn flitted across his lined features.

"Gentlemen," he said simply, "I must confess that I never anticipated this hostile attitude on the part of a so-called democratic and enlightened group, such as you profess to be. My invention is my own and I take modest pride in knowing that I am the first and only living man today who has successfully duplicated bioluminescence on a practical scale, notwithstanding your extravagant claims to priority. I realize all too well the immense upheaval in the realm of illumination all over the world if my principle of cold light were to be adopted universally. The motive for your insolent antagonism is therefore rather too obvious. I reasoned, nevertheless, that my invention could best be exploited and put at the disposal of mankind by a great organization like your own, controlling as it does the entire field of incandescent illumination all over the world.

"However," he added with a significant shrug of his shoulders, turning to his assistant, "I fear we have been mistaken, Walter. You may dismantle the 'Luminor,' and we shall make haste to leave the premises immediately."

Then turning to the others, he announced tersely: "Whenever you men decide that you would desire a demonstration of my device, I shall be pleased to accede, under conditions of my own choice. These conditions are that the test shall be made in the presence of a special committee, consisting of your President, your Chairman of the Board of Directors and your Chief of Research representing your company, three scientists whom I shall pick and three impartial outsiders, qualified to pass on the merits of my 'Luminor.' This committee will sit as a jury to determine the worth of the device. If I do not hear from you in the course of the next twenty-four hours I shall assume that you are not interested, and shall commence to take steps toward the proper development of my lamp. I refuse to be brow-beaten or intimidated, because I have a boundless faith in my invention and its possibilities. And I assure you that I shall have no difficulty in procuring the requisite financial backing to exploit it independently. And one more point, before I'm through. I warn you that the popular sympathy will be entirely in my favor in this controversy. The public has been learning more and more about the subject of luminescence in the last few months. They

have been awakened to its vast potentialities principally by my spectacular exploits. And so I am safe in predicting that, when the truth of this whole episode becomes known, there will be such a burst of revulsion against your autocratic blackmailing practices, that you will be swept into financial and social oblivion by an enraged people. With all your tremendous wealth and your limitless resources, you can no more hold back the triumphant march of progress and enlightenment and human advancement than could King Canute of ancient days keep back the surging waves of the ocean by his haughty command. In your narrow and bigoted policy of obstruction you stand for the same unprogressive, reactionary spirit that is exemplified in the old-time opposition against the developments of the machine age, against the steamship, the locomotive, the telegraph, telephone and countless other steps in the advance of human knowledge, human betterment, and civilization itself."

With this parting shot, Dr. Hament, cheeks flushed and eyes blazing, turned to Graham, who had completed the repacking of the lamp and its accessories and nodded toward the door.

"Hold on a minute, Hament," spoke up Joyce, "in the event that we find your invention suited to our needs, and capable of being fitted into our own plans of development, what consideration would you regard as a sum sufficient to compensate you for your work and trouble?"

"One million dollars!" came the answer, like a rifle shot—"cash or certified check!" and the door slammed, blotting out a chorus of derisive and uproarous laughter from within.

CHAPTER IV

"Hament's Hoax"

SECRET OF "COLD LIGHT" REVEALED

OBSCURE SCIENTIST DEVELOPS MARVELOUS LAMP ON PRINCIPLE OF FIREFLY—DETAILS CLOSELY GUARDED

New York, Sept. 20.—Advices from a well-authenticated source reveal that the executives and technical directors of the International Illumination Corporation have been conducting negotiations with an unknown inventor who has demonstrated the solution of the intriguing problem of "cold light." According to reliable information, this scientist, a certain Dr. Arthur Hament, with the aid only of a youthful assistant, and working diligently and unobtrusively for years, has perfected a "cold light" lamp, whose efficiency of energy conversion and illumination is very nearly 100 per cent.

Specific details as to the mechanism of this new lamp are lacking, and at the local offices of the Corporation there is a strange air of mystery and reticence. None of the higher officials are willing to answer questions, insisting that important announcements will be forthcoming shortly. It is generally conceded by many noted men of science who have been questioned on the subject that, should the final facts bear out the current rumors and reports, then the illumination industry is due for a revolutionary upheaval even more phenomenal than that produced by the advent of the incandescent electric light.

It is the belief of many who are in close touch with the matter that this obscure inventor, Hament, might be able to throw some significant light upon the mystifying "Human Firefly" occurrences that so thoroughly terrorized certain parts of the state several months ago.

News items similar to the above were featured in the press all over the country. Reporters scurried about energetically, trying to rustle up some reliable information on the revolutionary invention. They pored over every scientific directory and every "Who's Who in Science" extant, but found nothing that would even hint at the identity or domicile of the mysterious Dr. Arthur Hament. The every-day individual read the reports eagerly, and discussed the subject of cold light enthusiastically, with everyone he happened to meet. The topic became a household by-word throughout the length of the land. In the space of a few days the contagious approbation had spread over the entire civilized world. Regarding the matter as already an established fact humanity, as with one voice, sent up a united chorus of acclaim for the remarkable invention, and its still more remarkable inventor. The offices of the International in all the principal capitals of the world were besieged by rabid inquirers, all hungry for some meager scrap of information, some inkling as to the nature of the new and wonderful source of illumination. All such queries were met with polite but firm statements that everything would be revealed in due time.

* * * * * *

TO this very day Dr. Hament cannot explain how the mysterious burglary was accomplished. With both Graham and himself asleep on the lower floor of their cottage, the nocturnal intruders must have worked with feline stealthiness to force a kitchen window in the rear, pass through into their bedroom, then beyond into the hallway and up the creaking stairway to the laboratory on the second floor. The only explanation that appeared at all feasible was that the slumbering pair were drugged in their sleep, and that the marauders were then able to work with great leisure and thoroughness. This theory seems to be borne out by the slight feeling of nausea and dizziness with which they struggled into wakefulness, and the faint sweetish odor that pervaded their room. Whatever means the intruders had employed to effect an entry into the laboratory above, their plundering was certainly accomplished with a mathematical and meticulous attention to details. Nothing appeared to have been overlooked. A large quantity of assorted types of luciferin, carefully bottled and labeled, were taken, as was also a considerable amount of rare chemicals that were employed in the synthesis of these photogenic substances. In addition, a complete model of the "Colite Luminor" was removed, together with two others that had been partly dismantled. The burglars did not overlook a half dozen notebooks containing plans and specifications of the new lamp, as well as a vast collection of mathematical and chemical data, formulas and equations, experimental directions and notes, together with observations and measurements of a highly intricate nature. Curiously enough, a large amount of platinum, consisting of foil, crucibles and wire was not molested, likewise a sizable quantity of gold and silver. It was very evident that the thieves knew just what they wanted, and wasted no time in getting it. In its thoroughgoing completeness, the job was one that would gladden the heart of a veteran second-story man. Dr. Hament made a careful inventory of the losses, checked and rechecked the items missing, and then smiled in a very knowing manner to Graham. The burglary was not reported to the police, and to all outward appearances nothing of any startling nature had occurred.

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THE opening night of the stupendous International Illumination Exposition was heralded by a veritable blaze of glory. The colossal Exposition Hall in New York was a galaxy of color and dazzling brilliance. Every

lighting device used in modern days was on exhibition. Myriads of lamps, of all shapes and sizes, and made for a thousand varied uses, illuminated the interior of the vast hall with a blinding intensity that rivaled the sun in splendor. One complete wing of the exposition palace was given over to an exhibition depicting the progress in the science and art of illumination from the earliest beginnings of fire in recorded history, down to the huge and brilliant incandescent lamps of the latest design. Everywhere there blinked advertising displays and devices that demonstrated the highest type of resourcefulness and inventive genius. Suspended from the huge dome-shaped ceiling hung a number of tremendous lighting fixtures of almost blinding incandescence. They shed a penetrating blue-white illumination over the entire exhibition floor below, and completed the grand picture of one magnificent blaze of light.

THOUSANDS poured through all the entrances at the moment of opening, eager to bathe in the incandescent brilliance, and to inspect and marvel at the latest advances in the field of illumination. But much more anxious was each spectator to witness the long-heralded "cold light" demonstration. Every notice, every newspaper advertisement, every printed word describing the forthcoming Exposition had promised some startling revelations in connection with the new invention. A "cold light" exhibition of great import was scheduled for the opening night, and certain news of a highly sensational character was to be divulged.

There was much hunting and inquiring for the location of the exhibit of major attraction, but to the hundreds of questions fired at the guides and attendants of the hall there was one single, monotonous reply: "Wait and see." It was apparent that the exposition officials were planning to spring the event in the nature of a huge surprise.

At the very height of the hubbub and shuffling of the countless hundreds of visitors parading from booth to booth in slow streams, there suddenly burst forth, as if from nowhere, a deep stentorian voice:

"Ladies and gentlemen!——"

The electric public address system was booming forth a message and the assembled multitude ceased their meandering and conversing to crane their necks upward. A diminutive balcony circled the great enclosure, and at the railing stood a man, talking into a microphone. In front of him a small wooden platform extended out beyond the railing, supported by a bracket from below. A queer device rested on it, a contrivance that in general appearance bore a striking resemblance to a parlor kerosene lamp. Supported on a metal tripod, it consisted of a barrel-shaped body surmounted by a large spherical globe of some creamy-white, glass-like material. The entire apparatus stood about eighteen inches high. Apparently nobody among that entire mass of surging humanity had taken the pains to look up and observe this queer device, until the moment when the attention of the multitude was drawn to the balcony by the opening words from the amplifying horns. Nor had anyone until this instant taken notice of a small painted placard hanging right below the wooden platform, and bearing the simple legend:

HAMENT'S
HOAX

The vast assemblage became silent and motionless, and thousands of eager and expectant eyes focused aloft on the single figure at the microphone, and the mysterious contrivance in front of him. Here was the long-awaited demonstration and announcement and every ear strained to catch the momentous message.

"Ladies and gentlemen," the speaker's words came blaring from the concealed horns, "the officials of the International Illumination Corporation ask that you bear with them in a great, almost tragic disappointment. I realize that you came here with great anticipation of observing the much-discussed 'cold light' lamp. In our negotiations with the inventor, we of the International were equally anxious to see a really practical solution of this great problem. The very foundation of our organization has always been the fostering and developing of all things that tend to better the illumination art. We must now confess a profound disillusionment. Our technical staffs have made a thorough and exhaustive investigation into the device submitted by this inventor, Dr. Hament. They find that his claims of having perfected a practical 'cold light' lamp are founded on no truth whatsoever. Having created a tremendous wave of popular interest in his alleged illumination device, he is now found to be unable to substantiate his extravagant assertions. Our belief is that this man is nothing more than a clever publicity seeker, intending to capitalize in some shady fashion, on the immense advertising which this situation has given him.

"Our capable research department has been struggling with the real problem of 'cold light' for many years, and the unanimous opinion of our experts now is that it can never be solved from the practical and commercial standpoint. They admit that the luminescence of various insects and other species of living organisms is an interesting scientific phenomenon, but there is where the matter ends. Certain definite and apparently permanent difficulties stand in the way of making this form of illumination available for the use of mankind. Therefore, my dear friends assembled here tonight, we take this opportunity of affirming our steadfast convictions that the science and art of lighting, as exemplified in the thousands of exhibits all about you here have reached their acme of perfection. Although we admit that it possesses certain limitations, the fundamental principle of incandescence, the principle first developed to a practical point by Edison, still stands sound and supreme."

THE speaker stopped, and a hum as from a thousand beehives rolled up from the densely packed crowds below. People whispered to each other excitedly. Stranger turned to stranger to discuss this sensational announcement. It was clear that the agitated gathering had been tremendously affected by the startling revelation.

A hush fell upon the multitude as he continued:

"Our technical experts have here prepared for your benefit what might be termed a 'negative demonstration.' On this platform before me is an exact replica of the inventor's 'Colite Luminor' as he has christened it. It is faithful in every detail. In its oxidation chamber here is contained a quantity of luciferin compound, a substance which is analagous to the 'oil' that is 'burned' in the luminous organ of the firefly. This photogenic material is the product of our own research laboratory, and is a marvelous example of synthetic chemical skill. It is identical with the luciferin that the inventor claims to have developed.

"With a desire to be perfectly fair in our treatment of this man and his alleged invention, we have arranged a *bona fide* demonstration of the device. We are confident that this test will serve to show you all how futile is the dream of commercially feasible 'cold light' illumination, and by contrast to impress even more vividly on you the essential strength and dependability of our modern incandescent light."

The speaker took a step back and signaled to some unseen person behind him. One by one the huge globes suspended from the ceiling were dimmed and finally plunged into darkness. On all sides lights went out. Flashing advertising signs ceased their luminous cavorting and were extinguished. Mercury-vapor lamps, glaring ultra-violet generators and tiny flashlight bulbs were turned off as if by magic, and slowly the vast hall was shrouded in darkness, a darkness that appeared infinitely more profound by contrast with the previous blinding illumination. Only the distant exit-lights pierced the gloom with feeble rays of red light, and served to throw a fantastic, almost supernatural aspect about the scene. The hushed crowds waited in awed anticipation, yet not knowing what to expect. Those who were standing directly below the tiny platform with the strange lamp perched on it, could barely make out the shadowy form of the announcer manipulating some adjusting device on the apparatus.

"The light of the firefly," continued the electrical voice, "depends on the oxidation of its luciferin. To imitate this insect I am now passing a stream of pure oxygen through a special mixture of our synthetic luciferin—and lo!"—with a merry laugh that rolled and re-echoed through the vast hall—*"nothing happens!"*

For the space of a minute or two one could have heard the proverbial pin drop. No one moved, no one breathed—all eyes were glued to the globe of the strange contrivance, just dimly discernible by its hazy outline. The darkness continued, stygian and impenetrable, and the unearthly silence was almost terrifying. Suddenly a hysterical shriek pierced the gloom from the far corner of the hall. A woman clutched her neighbor's arm convulsively and pointed aloft with horror in her eyes. A thousand faces turned to follow and a thousand throats uttered a gasp that swept through the building like the sighing of the wind.

"The Firefly!—The Human Firefly!" rose the cry, passing from lip to lip, and swelling into a mighty chorus ascending to the vaulted dome above.

In the far corner of the narrow balcony, directly over the main entrance to the exposition floor, there appeared a luminous face, glowing brightly in the inky darkness. Visible at first as only a mere speck of light at that extreme distance, it was seen to move rapidly just above the edge of the stone balustrade, approaching the spot where the strange lamp was on exhibition. At last it was directly behind the tiny platform and in clear view of the horrified thousands below. A luminous hand, knarled and thin, waved the astonished announcer away from the microphone, and the beaming and kindly countenance of Dr. Hament faced the awed multitude below. Panting from the exertion, the old scientist, for the space of several minutes, could no more than just stand there, clutching the railing with his glowing fingers and surveying the dim sea of heads below. Nobody stirred. The thrilling aspect of a brightly luminous face, high up on the tiny balcony, punctuating the vast ocean of gloom with a brilliant luminescence, was sufficient to strike boundless amazement, if not terror into the hearts of the spectators.

"My friends!" came the kindly voice of the luminous man, and the reverberating words from the amplifying horns broke the magic spell that appeared to have been cast over the entire assemblage.

"My friends, you will pardon me, I hope, for thus startling you by my strange appearance, just as I know you will pardon my previous bizarre visitations among you in this unconventional manner. Yes, my good people, the 'Human Firefly' stands before you, as does also the inventor of the 'Hament Colite Luminor.' In the face of the scathing accusations and insulting references to which you have just listened, it is no more than fair that I present myself here and offer a defence. The worthy representative of the International has been good enough to explain to you in detail the story of my invention. He has informed you of the remarkable work of their chemists and research workers in synthesizing the firefly's luminous principle that is known as luciferin. Unfortunately, he has neglected to give you any information on some other very vital matters. For some strange reason, he failed to mention the shrewd business acumen of the International executives in attempting to browbeat and blackmail me for the sake of suppressing my invention. He completely forgot to tell you of how skilfully the hired burglars of his company broke into my laboratory, and tried to steal my most intimate secrets for the construction and manipulation of the 'Colite Luminor.'"

A BUZZ of astonishment rose from the crowd. A luminous hand stroked the barrel-like body of the model on the platform, and a luminous cheek brushed caressingly against the glassy globe that surmounted it.

"There is one other thing," continued Dr. Hament, "which the spokesman of this unscrupulous clique has failed to tell you, not so much from actual design as from sheer ignorance. I suspected it from the start, and now my suspicions are completely confirmed. This device, standing here now before your very eyes, has been proved an apparent failure. It doesn't work, and I feel safe in stating that it never will work—not in a thousand years—at least in the form in which it now exists. These talented scientists, these skilful investigators in the laboratories of the corporation have, if we are to believe their spokesman, performed some sensational feats of chemical synthesis. They have forced nature to reveal the secret of the firefly and the chemical character of the luciferin. But in their boundless zeal they have overlooked a point—one single detail—that might have been discovered with ease by a high school student of chemistry and physiology.

"Let me give you an elementary idea regarding the nature of this missing point. A large number of chemical reactions are not brought about, or at most proceed with infinite slowness, unless a certain substance is present to help the reaction along. These chemical materials that assist in effecting processes, without themselves being in any manner changed, are known as *catalytic agents,* or *catalysts.* You have in your body dozens of such substances, that go by the name of *enzymes,* whose function is to assist the various chemical changes going on in your system. For example, when you chew bread, a special catalyst in your saliva mixes with it and slowly converts the starch into glucose sugar. Similarly, in the entire process of digestion going on in your stom-

ach and intestines, certain enzymes assist in the change from insoluble nutrients to soluble products that may be absorbed in the blood stream.

"The firefly, as do all other luminous organisms, possesses the remarkable substance, called luciferin, which combines with the oxygen of the air in the presence of water, to produce its luminescence. However, something more than luciferin, oxygen and water are necessary, and this is what the enlightened scientists of the International Illumination Corporation have apparently overlooked. The luminous organism manufactures also a tiny bit of another substance, which is of vital necessity in the production of luminescence. It is the catalyst for this chemical reaction, and its name is *luciferase*. It is not consumed in the process, but in some mysterious manner, it brings about the oxidation reaction. Without it the oxidation of luciferin takes place so slowly that there is no production of light.

"The skilful burglars, hired by the company to raid my workshop, managed to obtain everything of value in the duplication of my work, with the sole exception of the luciferase. My notes on the preparation of this chemical compound, together with some samples that were stored with these notes, were unfortunately—or shall I say fortunately—overlooked. The remarkable research brains in the employ of the company were unable to grasp the idea that something essential was lacking in their attempted production of the firefly's 'cold light.' They went right ahead, set up my model lamp, charged it with the necessary luciferin and water, and passed oxygen through the mixture. Nothing happened, for the simple reason that nothing *could* happen. And on the basis of these half-baked results, they shout to the world that my invention is a hoax, that I am nothing but a shrewd publicity seeker, and that the entire problem of commercial 'cold light' is an impossibility and a fraud.

"My friends, I came to this hall prepared to turn this little 'negative demonstration' into one that is undeniably 'positive.' I am grateful to the good people of the International Illumination Corporation for preparing the stage for me in so dramatic a fashion. I could not have wished for a better opportunity to present to the world the first practical 'cold light' lamp!"

A LUMINOUS hand reached into an invisible pocket and emerged clutching a small glass vial. Another glowing hand fumbled with the clamp that fastened the tiny cover near the top of the barrel-like body of the lamp. With trembling fingers the old inventor emptied the contents of the tube into the opening. He fumbled in the dark recesses under the device, adjusting a switch here, operating a control there. A low whining sound issued from the innermost anatomy of the lamp, a sound resembling the starting of a miniature vacuum cleaner. The result was amazing as it was sudden. The dull glass-like globe that perched on top of the queer mechanism began to glow with a pale greenish phosphorescence. Only a brief second or two did this glow last. Then like a flash the globe burst into a blaze of such magnificent brilliance as to produce a momentary blindness in all. The huge exposition hall, shrouded in a thick, almost ponderable darkness just a moment ago, was now flooded by a penetrating deluge of light reaching into the remotest corner of the building. Dr. Hament, aware though he was of what to expect, could not help but shrink back a step or two, and shield his eyes. In the dazzling light his previously luminescent features were now paled into the sickliest kind of glow. The several men grouped on the balcony in the immediate vicinity of the lamp, including the former announcer, were almost thrown off their feet by the overpowering brilliance of the illumination, and clapped their hands to their faces to shut out the strong rays of light. Below, the huge multitude was electrified by the dazzling demonstration. Eyes blinked and faces turned away from the direct glare of the Luminor.

The effect was truly remarkable, almost supernatural. There stood a lamp, ridiculously toy-like in appearance, compared to the mammoth globes, now darkened, hanging from the ceiling. And yet this puny contrivance was throwing off a light so powerful that the most distant nook and corner of the exposition floor was bathed in a brilliance rivaling the noonday sun. By comparison, the previous incandescent blaze of thousands of lighting devices was as feeble as the rays from a candle flame.

For the space of a few tense moments the great throng stood petrified by the sheer magnitude of the mighty spectacle. Then, as though by the breaking of a magic charm, the assemblage was galvanized into sound and action. A wild cheer burst forth, a mighty yell that crashed to the roof and reverberated like a thousand Niagaras suddenly released. Bedlam broke loose over the huge exposition floor. Arms waved wildly like a field of wheat in a windstorm. Waves of humanity swayed and surged below, as those in the more distant corners attempted to get closer. A fever heat of excitement suffused the entire multitude, and above all there clashed and echoed the throaty cheers of appreciating thousands. So spontaneous and soul-stirring a demonstration had never been witnessed even in the memory of the oldest spectator present. There was no iota of doubt regarding the verdict of the public as to the aged scientist's marvelous invention. Dr. Hament, almost overcome by the magnificent demonstration of the crowd, smiled weakly and waved a sign of appreciation and gratitude. As one final convincing gesture, he placed both hands on the dazzling globe, and brought his face down so that his cheek rubbed caressingly on the glassy surface. Then, he held forth his hands to the people below and his smiling lips formed the single inarticulate word: "Cold!" Wave upon wave of unbridled cheering rolled from a thousand throats and splashed back from walls and ceiling in a mighty pandemonium of noise.

* * * * * *

THE original Luminor is still preserved as a relic and memento of priceless value in the New York office of the Universal Colite Corporation. No longer in use now, but carefully protected in a glass case, it stands as a fitting symbol to mark man's conquest in the romantic struggle to achieve practicable "cold light." Dr. Hament, now grown feeble, has relinquished the reins of the organization which he fostered to younger hands and nimbler brains. Walter Graham, the leading figure now in the world-wide Colite enterprise, is at the head of a huge development that has sent the blessings and conveniences and economies of the new source of illumination to all corners of the civilized globe. But the old inventor never tires of narrating to any interested person who desires to listen, the thrilling story of his invention, the insidious duplicity of the International Illumination bunch, and the dramatic and brilliant climax of Colite luminescence which he enacted at the Exposition.

THE END

The Brain Accelerator

By Dr. Daniel Dressler

(*Continued from page 705*)

thing of the uneasiness of the past hours still on my mind, I began to share his sense of agitation, and seizing my bag, led the way to my car.

Murphy became more unsettled still, as we bounced and rattled over the not too smooth road leading toward the house, but he volunteered only one remark:

"He's been fooling with that light and those dogs again and just before he gave me the note I think he turned the thing on himself."

Engrossed by the task of steering the car at a speed much beyond its usual sedate pace, I made no reply and Murphy subsided.

The road south of Bolton leads straight for about a mile until the foot of the hill on which the house stood. From that place the Colonel's residence was in view. I glanced at it again from time to time, until I realized the absurdity of trying to fathom the activities within from its exterior. Murphy's foreboding had communicated itself to me and, coupled with my own uneasiness, it produced an urge to get to the Colonel that made me send the car along at a spanking rate.

At the foot of the hill there is a curve in the road and for the space of perhaps a hundred yards it leads through a thick copse of woods. The track is narrow and rough and any measure of speed is impossible. It was just as we passed through the center of this space that I heard a muffled explosion ahead and when we emerged from the woods, I saw the Colonel's house ablaze.

We speeded up the hill, but by the time we reached the gate, smoke and flames were pouring from the roof and from every window, while the heat prevented any close approach to the house wall. It needed no fireman's knowledge to realize that the house was doomed. I stopped at what seemed a safe distance and watched. Murphy leaped from the car and dashed for the library door. I shouted to him and then followed, for it was obvious self-destruction to attempt to approach the house, much more to enter it as he seemed bent upon doing. Within a hundred feet of the door the heat was intense; smoke billowed forth and sparks and burning fragments showered down, but Murphy ignored them and somehow made the door. He opened it and dashed within and, as I watched, the roof and then the wall tumbled down, burying him and lending fresh impetus to the blaze.

I returned to my car and met the first of the volunteer fire department from the village. They made a desultory attempt to throw water upon the fire but it was clearly futile. The blaze grew higher as wall after wall tumbled down and then subsided gradually until there was left only a heap of glowing embers with a pile of fused glass and tangled machinery where the laboratory had been.

THE next day the mass had cooled enough to enable identification of two burned remnants of bodies, close together below where I knew the library table to have been. No relatives came forward to claim them and I saw to their internment in the local cemetery.

An investigation by the probate court found no record whatever of the Colonel's affairs. The house had been leased from some one in the city and the owners knew only that the Colonel had rented it in person, paying cash once a year and giving no information about himself.

The Colonel and Murphy were dead. They dropped out of existence in a spectacular way, and yet except for a few details of his early life, there was little of interest to be elicited about them.

In the confusion of attending to the burial and at the same time to practice, and with a real feeling of grief at the tragic death of someone I had learned to like, it was more than a week before my mind reverted to the subject of the Colonel's experiments. Then I thought of his letter, which had lain unopened in my pocket since Murphy handed it to me. It was brief and toward the end gave evidence of either failing strength or weakening mind, for the words were scrawled and blurred until they were barely legible. I append it herewith:

"My dear Doctor:

"We were quite right regarding the electrical nature of the ray. I have proved that by the simple old electroscope test. And we were further right in that it will accelerate brain function in a human. *I have tried it upon myself and felt the immense increase in mental power which it engenders. But Doctor, we both overlooked one vital point. Increased function means increased metabolism and consequently increased wear upon the brain mechanism.* That is the reason we, as well as the dog, were fatigued. His lower grade nervous system withstood it better than ours, even though we experienced only reflected rays, whereas he received the direct rays. Today when I trained it upon myself, I felt for a time the invigorating effect and now I am realizing the aftermath of an overworked brain. I can write no more until I rest." G.

I have thought many hours over the whole affair, the experiment and the Colonel's last words.

Did he have hold of a principle and a means of applying it, as yet unknown to science? Was his tragic end an accident or a deliberate removal of himself and his apparatus when he felt that he had created a Frankenstein monster? It seems unlikely that any house should burn so fiercely and completely in so short a time, unless some incendiary agent were employed, and yet, such a way out was hardly the one such a man would take.

Were his apparatus and his experiments only the result of a diseased mind that found delight in mystifying me, a man of science? Did it carry the taint of a fixed idea as his insistence upon an electrical basis for the phenomenon, in the face of the obviously greater significance of the remainder of the experiment, might indicate?

I do not know. I *do* know that I saw a definitely dead dog apparently return to life and saw that dog perform mental feats beyond the power of average dog intelligence. I may have been the victim of a carefully planned illusion and the Colonel's end fortuitous, but again I say, I cannot be sure.

THE END.

The Undersea

By L. Taylor Hansen

Author of "What the Sodium Lines Revealed"

Acknowledgments to Harold K. Palmer, Ph.D., C.E.

IN the '60's, Mr. A. E. Beach, then editor of the "Scientific American," who died many years ago, evolved the idea of a tube to go under the city streets, cylindrical in cross-section and in which the car was to be driven by air pressure applied directly in the tube behind it. The car was surrounded by a series of brushes to rub against the metal tube, so as to make the joint airtight and avoid the waste of air. Such a tube was actually put into Broadway for the space of about a block near the City Hall Square and was also exhibited at the Fairs of the American Institute which was much patronized in those days of early and more simple and less sophisticated New York. It is quite possible that such a tube as is described by our author might be sufficiently improved some time in the future to be of practical value.

Illustrated by WESSO

IF my friend the engineer had not told me the Tube was dangerous, I would not have bought a ticket on that fatal night, and the world would never have learned the story of the Golden Cavern and the City of the Dead. Having therefore, according to universal custom, first made my report as the sole survivor of the much-discussed Undersea Tube disaster to the International Committee for the Investigation of Disasters, I am now ready to outline that story for the world. Naturally I am aware of the many wild tales and rumors that have been circulated ever since the accident, but I must ask my readers to bear with me while I attempt to briefly sketch, not only the tremendous difficulties to be overcome by the engineers, but also the wind-propulsion theory which was made use of in this undertaking; because it is only by understanding something of these two phases of the Tube's engineering problems that one can understand the accident and its subsequent revelations.

It will be recalled by those who have not allowed their view of modern history to become too hazy, that the close of the twentieth century saw a dream of the engineering world at last realized—the completion of the long-heralded undersea railroad. It will also be recalled that the engineers in charge of this stupendous undertaking were greatly encouraged by the signal success of the first tube under the English Channel, joining England and France by rail. However, it was from the second tube across the Channel and the tube connecting Montreal to New York, as well as the one connecting New York to Chicago, that they obtained some of their then radical ideas concerning the use of wind power for propulsion. Therefore, before the Undersea Tube had been completed, the engineers in charge had decided to make use of the new method in the world's longest tunnel, and upon that decision work was immediately commenced upon the blue-prints for the great air pumps that were to rise at the two ends—Liverpool and New York. However, I will touch upon the theory of wind-propulsion later and after the manner in which it was explained to me.

It will be recalled that after great ceremonies, the Tube was begun simultaneously at the two terminating cities and proceeded through solid rock—low enough below the ocean floor to overcome the terrible pressure of the body of water over it, and yet close enough to the sea to overcome the intensity of subterranean heat. Needless to say, it was an extremely hazardous undertaking, despite the very careful surveys that had been made, for the little parties of workmen could never tell when they would strike a crack or an unexpected crevice that would let down upon them with a terrible rush, the waters of the Atlantic. But hazard is adventure, and as the two little groups of laborers dug toward each other, the eyes of the press followed them with more persistent interest than it has ever followed the daily toil of any man or group of men, either before or since.

Tube

David L. Fox

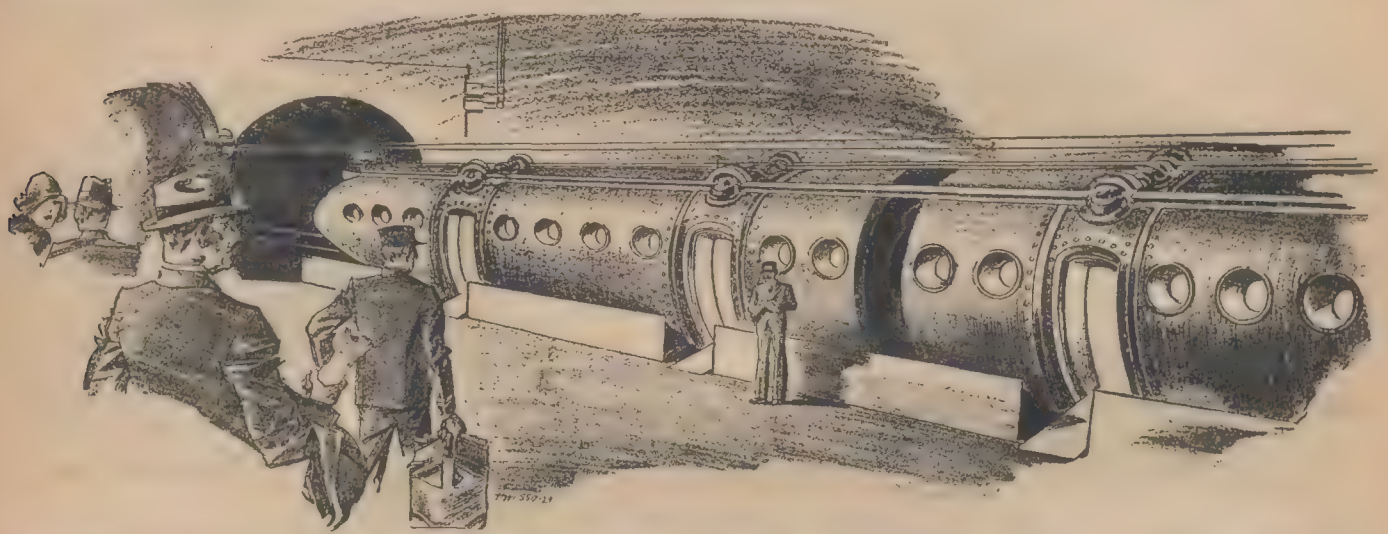
Then they found the jeweled casket, through whose glass top they peered curiously down upon the white body of a beautiful woman

ONCE the world was startled by the "extree-e—" announcing that the English group had broken into an extinct volcano, whose upper end had apparently been sealed ages before, for it contained not water but air—curiously close and choking perhaps, but at least it was not the watery deluge of death. And then came the great discovery. No one who lived through that time will forget the thrill that quickened the pulse of mankind when the American group digging through a seam of old lava under what scientists call the "ancient ridge," broke into a sealed cavern which gleamed in the probing flashlights of the workers like the scintillating points of a thousand diamonds. But when they found the jeweled casket, through whose glass top they peered curiously down upon the white body of a beautiful woman, partly draped in the ripples of her heavy, red hair, the world gasped and wondered. As every school child knows, the casket was opened by curious scientists, who flocked into the tube from the length of the world, but at the first exposure to the air, the strange liquid that had protected the body vanished, leaving in the casket not the white figure, but only a crumbling mass of grey dust. But the questions that the finding of the cave had raised remained unanswered.

Who was this woman? How did she get into the sealed cavern? If she had been the court favorite of that mythical kingdom, now sunk beneath the waves, and had been disposed of in court intrigue, why would her murderers have buried her in such a casket? How had she been killed? An unknown poison? Perhaps she had been a favorite slave of the monarch. This view gained

many converts among the archaeologists who argued that from all the evidence we have available, the race carrying the Iberian or Proto-Egyptian culture, long thought to have been the true refugees from sinking Atlantis, were a slight dark-haired race. Therefore this woman must have been a captive. Geologists, analyzing the lava, announced that it had hardened in air and not in water, while anthropologists classed the skull of the woman as essentially more modern than either the Neanderthal or Cro-Magnon types. But the engineers, secretly fuming at the delay, finally managed to fill up the cave and press on with their drills.

Then following the arguments that still flourished in the press, came a tiny little news article and the first message to carry concern to the hearts of the engineers. The sea had begun to trickle in through one slight crack. Perhaps it was only because the crevice was located on the English side of the now famous "ancient ridge" that the article brought forth any notice at all. But for the



engineers it meant the first warning of possibly ultimate disaster. They could not seal the crack, and pumps were brought into play. However, as a month wore on, the crack did not appear to widen to any material extent and the danger cry of a few pessimists was forgotten.

Finally, it will be remembered, that sounders listening in the rocks heard the drillers of the other party, and then with wild enthusiasm the work was pushed on to completion. The long Tube had been dug. Now it only remained for the sides at the junction to be enlarged and encased with cast iron, while the work of setting up the great machines designed to drive the pellet trains through, was also pushed on to its ultimate end. Man had essayed the greatest feat of engineering ever undertaken in the history of the planet, and had won. A period of wild celebration greeted the first human beings to cross each direction below the sea.

Did the volume of water increase that was carried daily out of the Tube and dumped from the two stations? If it did, the incident was ignored by the press. Instead, the fact that some "cranks" persisted in calling man's latest toy unsafe, only attracted more travel. The Undersea Tube functioned on regular schedule for three years, became the usual method of ocean transit, and in a word, was taken for granted by the public.

THIS was the state of matters, when on the fourth of March last, our textile company ordered me to France to straighten out some orders with the France house, the situation being such that they preferred to send a man. Why they did not use radio-vision, I do not care to state, as this is my company's business.

Therefore upon entering my apartment, I was in the midst of packing when the television phone called me. The jovial features of "Dutch" Higgins, my one-time college room-mate and now one of the much-maligned engineers of the Undersea Tube, smiled back at me from the disk.

"Where are you? I thought we had a sort of dinner engagement at my apartment, Bob."

"By gollies I forgot, Dutch. I'll be right over—before it gets cold."

Then immediately I turned the knob to the Municipal Aerial-car yards, and ordered my motor, as I grabbed my hat and hurried to the roof. In due time, of course, I sprang the big surprise of the evening, adding:

"And, of course, I'm going by the Tube. I feel sort of a half-partnership in it because you were one of the designers."

Coming upon them by night . . . they looked like a gigantic, shiny worm, of strange shape, through whose tiny port holes . . . in the sides, glowed its luminous vitals

A curious half-pained look crossed his face. We had finished our meal, and were smoking with pushed-back chairs. He finished filling his pipe, with a scowl on his forehead.

"Well? Why don't you say something? Thought you'd be—well sort of pleased."

He struck his automatic lighter and drew in a long puff of smoke before answering.

"Wish you'd take another route, Bob."

"Take another route?"

"Yes. If you want it straight, the Tube is not safe."

"You are joking."

But as I looked into his cold, thoughtful blue eyes, I knew he had never been more serious.

"I wish that you would go by the Trans-Atlantic Air Liners. They are just as fast."

"But you used to be so enthusiastic about the Tube, Dutch! Why I remember when it was being drilled that you would call me up at all kinds of wild hours to tell me the latest bits of news."

He nodded slowly.

"Yes, that was in the days before the crack."

"Yet you expected to take care of possible leaks, you know," I countered.

"But this crack opened after the tunnel had been dug past it, and lately it has opened still more."

"Are the other engineers alarmed?"

"No. We are easily taking care of the extra water and again the opening seems to remain at a stationary width as it did for the past three years. But we cannot caulk it.

"Are you going to publish these views?"

"No. I made out a minority report. I can do no more."

"Dutch, you are becoming over-cautious. First sign of old age."

"Perhaps," with the old smile.

"But after all it is now more than three years since we have had a talk on the Tube. After it began to function as well as the Air-Express you sort of lost interest in it."

"And the world did too."

"Certainly—but the public ever was a fickle mistress. Who said that before me?"

He laughed and blew out a long puff of smoke.

"Everyone, Bob."

"But as to the Tube, if I cross under the sea, I would want to be as well informed on the road as I was three years ago. Now in the mean time, you have dropped interest in the long tunnel while I have become more interested in textiles—with the result that I have forgotten all that I ever did know—which compared to your grasp of the details, was little enough."

BUT his face showed none of the old-time animation on the subject. What a different man, I mused to myself, from that enthusiastic engineering student that I used to come upon dreaming over his blue-prints. He was considered "half-cracked" in those days when he would enthuse over his undersea railroad, but his animated face was lit with inspiration. Now the light was gone. His eyes were cold—lifeless.

"Well Dutch, how about it? Aren't you going to make me that brief little sketch of the length plan and cross-section of the Tube? I remember your sketch of it in college, and it tends to confuse me with the real changes that were made necessary when the wind-propulsion method was adopted."

"All right, old timer. You remember that the Tube was widened at the sides?"

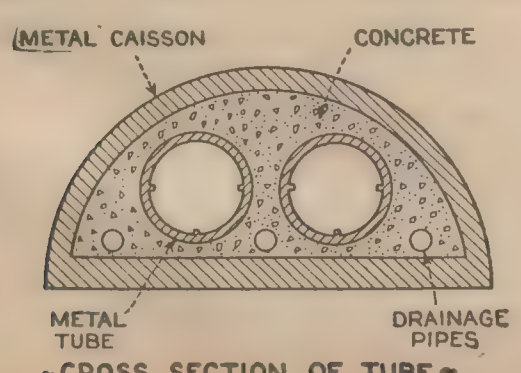
"Yes, of course."

"That was in order that we could make two circular tubes side by side—one going each way."

"I had forgotten that they were circular."

"That is because of the pressure. A circle presents the best resistance," and picking an odd envelope from his pocket, he made the following sketch and passed it to me.

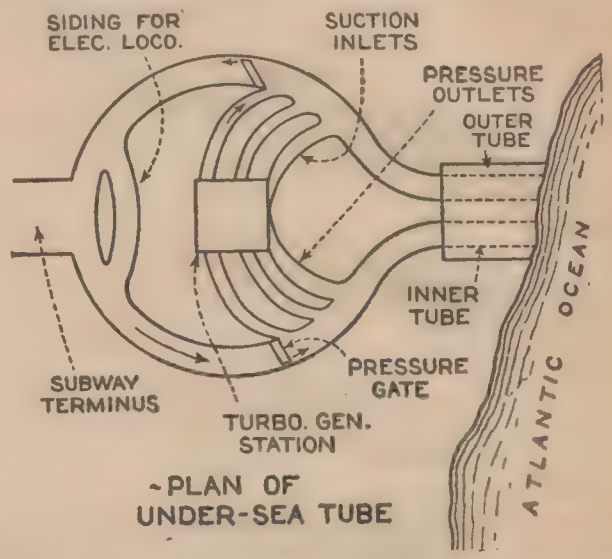
I nodded as I recognized the cross-section.



~CROSS SECTION OF TUBE~

"Now the plan of the thing is like this" he added, putting aside his pipe and pulling a sheet of paper from the corner of his desk.

Rapidly, with all of his old accuracy, he sketched the main plan and leaned over as he handed it to me.



~PLAN OF UNDER-SEA TUBE

"You see," he explained, picking up his pipe again, "both pumps work at one time—in fact, I should say all four, because this plan is duplicated on the English side. On both ends then, a train is gently pushed in by an electric locomotive. A car at a time goes through the gate so that there is a cushion of air between each car. The same thing happens at Liverpool. Now, when the due train comes out of the suction tube, it goes on out the gate, but the air behind it travels right on around and comes in behind the train that is leaving."

"But how are you assured that it will not stall somewhere?"

"It won't be likely to with pressure pumps going behind it and suction pumps pulling from in front. We can always put extra power on if necessary. Thus far the road has worked perfectly."

"How much power do you need to send it through, under normal conditions?"

"Our trains have been averaging about fifty tons, and for that weight we have found that a pound pressure is quite sufficient. Now, taking the tunnel's length as four thousand miles (of course it is not that long, but round figures are most convenient) and the tube width eleven and one quarter feet each, and working this out we have 3,020,000 cubic feet of free air per minute or 2,904,000 cubic feet of compressed air, which would use about 70,000 horse power on the air compressor."

"But isn't the speed rather dizzy?"

"Not any more dizzy, Bob, than those old fashioned money-carrying machines that the department stores used to use—that is in comparison to size. The average speed is about 360 feet a second. Of course, the train is allowed to slow down toward the end of its run, even before it hits the braking machinery beyond the gate."

"But how much pressure did you say would be put on the back of the diaphragm—I remember that each car has a flat disc on the back that fits fairly tightly to the tube. . ."

"The pressure on the back is less than seven tons. However, the disc does not fit tight. There are several leaks. For instance, the cars are as you know, run on the principle of the monorail with a guiding rail on each

side. The grooves for the rails with their three rollers are in each car. There is a slight leakage of air here."

"You used the turbo type of blower, didn't you?"

"Had to because of the noise. We put some silencing devices on that and yet we could not kill all of the racket. However a new invention has come up that we will make use of soon now."

"BUT I can't understand, Dutch, why you seemed so put out when I announced my intention of going to Europe via the Tube. Why, I can remember the day when that would have tickled you to death."

"You followed the digging of the Tube, didn't you?"

"Yes, of course."

"You remember the volcano and lava seams?"

"Yes."

"Well, I do not believe that the crack was a pressure crevice. If it had been, we were far enough below the ocean floor to have partly relieved the situation by the unusually solid building of the Tube. The tremendous shell of this new type of specially hardened metal——"

"And the rich concrete that was used as filling! That was one job that no one slipped up on. I remember how you watched it——"

"Yet the crack has widened Bob, since the Tube was completed."

"How can you be certain?"

"By the amount of water coming through the drain pipes."

"But you said that once more it was stationary."

"Yes, and that is the very thing that proves, I believe, the nature of the crack."

"I don't follow you."

"Why it isn't a crack at all Bob. It is an earthquake fault."

"Good heavens, you don't mean——"

"Yes I do. I mean that the next time the land slips, our little tube will be twisted up like a piece of string, or crushed like an eggshell. That always was a rocky bit of land. I thought in going that far north, though, that we had missed the main line of activity; I mean the disturbances that had once wiped out a whole nation, if your scientists are correct."

"Then you mean that it is only a matter of time?"

"Yes, and I have been informed by one expert that the old volcanic activity is not dead either."

"So that is what has stolen away your laugh?"

"Well I am one of the engineers—and they won't suspend the service."

"Fate has played an ugly trick on you Dutch, and through your own dreams too. However, you have made me decide to go by the Tube."

He took his pipe out of his mouth and stared at me.

"Sooner or later the Tube will be through, and I have never been across. Nothing risked—a dull life. Mine has been altogether too dull. I am now most certainly going by the Tube."

A bit of the old fire lit up his eyes.

"Same old Bob," he grunted as I rose, and then he grasped my hand with a grin.

"Good luck, my boy, on your journey, and may old Vulcan be out on a vacation when you pass his door."

Thus we said good-by. I did not know then that I would never see him again—that he also took the train that night in order to make one last plea to the International Committee, and so laid down his life with all the unsuspecting passengers for whom he had pleaded.

It was with many conflicting thoughts, however, that I hurried to the great Terminus that fatal night, where after being ticketed, photographed and tabulated by an efficient army of clerks, I found myself in due time, being ushered to my car of the train.

FOR the benefit of those who have never ridden upon the famous "Flier," I could describe the cars no better than to say that coming upon them by night as I did, they looked like a gigantic, shiny worm, of strange shape, through whose tiny port-holes of heavy glass in the sides, glowed its luminous vitals.

I was pompously shown to the front car, which very much resembled a tremendous cartridge—as did all of the other segments of this great glow-worm.

Having dismissed the porter with a tip and the suspicion that my having the front car was the work of my friend, who was willing to give me my money's worth of thrill, and that the porter was aware of this, I stowed away my bags and started to get ready for bed. I had no sooner taken off my coat than the door was opened and an old fellow with a mass of silver hair peered in at me.

"I beg your pardon, sir, but I understand you have engaged this car alone?"

"Yes."

"I can get no other accommodations tonight. You have an extra berth here and I must get to Paris tomorrow. I will pay you well——"

I smiled.

"Take it. I was beginning to feel lonesome, anyway."

He bowed gravely and ordered the porter to bring in his things. I decided he was a musician. Only artists go in for such lovely hair. But he undressed in dignified silence, not casting so much as another glance in my direction, while on my part I also forgot his presence when, looking through the port-hole, I realized that the train had begun to move. Soon the drone of the propelling engines began to make itself heard. Then the train began to dip down and the steel sides of the entrance became too high for me to see over. My friend of the silver hair had already turned off the light, and now I knew by the darkness that we had entered the Tube. For some time I lay awake thinking of "Dutch" and the ultimate failure of his life's dream, as he had outlined it to me, and then I sank into a deep, dreamless sleep.

I was awakened by a terrible shock that hurled me up against the side of the compartment. A dull, red glow poured through the port-hole, lighting up the interior with a weird, bloody reflection. I crept painfully up to the port-hole and looked out. The strangest sight that man has ever looked upon, met my eyes. The side of the wall had blown out into a gigantic cavern, and with it the rest of the cars had rolled down the bluff a tangled, twisted mass of steel. My car had almost passed by, and now it still stuck in the tube, even though the last port-hole through which I peered seemed to be suspended in air. But it was not the wrecked cars from which rose such wails of despair and agony that held my attention, but the cavern itself. For it was not really a cave, but a vast underground city whose wide, marble streets stretched away to an inferno of flame and lava. By the terrible light was lit up the great white palace with its gold-tipped scrolls, and closer to me, the golden

temple of the Sun, with its tiers of lustrous yellow stairs —stairs worn by the feet of many generations.

Above the stairs towered the great statue of a man on horseback. He was dressed in a sort of tunic, and in his uplifted arm he carried a scroll as if for the people to read. His face was turned toward me, and I marveled even in that wild moment that the unknown sculptor could have caught such an expression of appeal. I can see the high intellectual brow as if it were before me at this moment—the level, sympathetic eyes and the firm chin.

THEN something moving caught my eyes, and I swear I saw a child—a living child coming from the burning city—running madly, breathlessly from a wave of glowing lava that threatened to engulf him at any moment. In spite of all the ridicule that has been showered upon me, I still declare that the child did not come from the wreckage and that he wore a tunic similar to the one of the statue and not the torn bit of a night-gown or sheet.

He was some distance from me, but I could plainly see his expression of wild distraction as he began to climb those gleaming stairs. Strangely lustrous in the weird light, was that worn stairway of gold—gold, the ancient metal of the Sun. With the slowness of one about to faint he dragged himself up, while his breath seemed to be torn from his throat in agonizing gasps. Behind him, the glowing liquid splashed against the steps and the yellow metal of the Sun began to drip into its fiery cauldron.

The child reached the leg of the horse and clung there. . . . Then suddenly the whole scene began to shake as if I had been looking at a mirage, while just behind my car I had a flashing glimpse in that lurid light of an emerald-green deluge bursting in like a dark sky of solid water, and in that split-second before a crushing blow upon my back, even through that tangle of bed-clothes, knocked me into unconsciousness, I seemed to hear again the hopeless note in the voice of my friend as he said:

"——an earthquake fault."

After what seemed to me aeons of strange, buzzing noises and peculiar lights, I at last made out the objects around me as those of a hospital. Men with serious faces were watching me. I have since been told that I babbled incoherently about "saving the little fellow" and other equally incomprehensible murmurings. From them I learned that the train the other way was washed out, a tangled mass of wreckage just like my car, both terminus stations wrecked utterly, and no one found alive except myself. So, although I am to be a hopeless cripple, yet I am not sorry that the skill and untiring patience of the great English surgeon, Dr. Thompson, managed to nurse back the feeble spark of my life through all those weeks that I hung on the borderland; for if he had not, the world never would have known.

As it is, I wonder over the events of that night as if it had not been an experience at all—but a wild, weird dream. Even the gentleman with the mass of silver hair is a mystery, for he was never identified, and yet in my mind's recesses I can still hear his cultured voice asking about the extra berth, and mentioning his pressing mission to Paris. And somehow, he gives the last touch of strangeness to the events of that fatal night, and in my mind, he becomes a part of it no less than the child on the stairs, the burning inferno that lit the background, and the great statue of that unknown hero who held out his scroll for a moment in that lurid light, like a symbol from the sunken City of the Dead.

THE END.

What Do You Know?

READERS of AMAZING STORIES have frequently commented upon the fact that there is more actual knowledge to be gained through reading its pages than from many a textbook. Moreover, most of the stories are written in a popular vein, making it possible for anyone to grasp important facts.

The questions which we give below are all answered on the pages as listed at the end of the questions. Please see if you can answer the questions without looking for the answer, and see how well you check up on your general knowledge of science.

1. How is a man's height affected by the actions of the the glands in the body? (See page 680.)
2. What glands affect height by their secretions? (See page 680.)
3. How many protons and electrons in an atom of gold? How are they distributed? (See page 682.)
4. Is all sound, at any pitch, audible? (See page 692.)
5. How does a nerve trunk react to a Faradic or induced current? (See page 699.)
6. What division of animal nature is of the highest type? (See page 700.)
7. What things in the natural world produce cold light? (See page 709.)
8. What is bioluminescence? (See page 709.)
9. Can you describe the physiology of the firefly (so called)? (See page 710.)
10. What is the usual cause of light? (See page 712.)
11. What chemical action occurs in the firefly? (See page 713.)
12. What is the function of enzymes in the human system? (See page 718.)
13. How would you calculate in the simplest way, the edge of a cube which would exactly fit into a sphere of 120 feet diameter? (See page 758-9.)
14. Are light rays affected by the motion of a luminous body directly toward or away from us? (See page 768.)

PART II

The Secret

WHEN Pizarro, at the head of a little band of intrepid Spaniards conquered Peru, he found there a wonderfully civilized race of Indians. The remains and relics of their old civilization are today one of the most interesting things to be seen by the ethnologist and antiquarian in the interior of South America. Findings made in ancient Indian villages, if they could speak, would tell more than one story much stranger than fiction.

The second instalment of "The Secret Kingdom" easily maintains the pace set by the preceding chapters. Like the rest of the story, it is based on a considerable amount of fact, mingled with imagination that does not go beyond the realm of possibility.

What Went Before:

ALFRED BELL, scientist, detailed by the Society for Biological Research, in search of hitherto unknown species of plants, animals, birds and insects in the great, forbidding Brazilian wilderness, is being hounded by a German, posing as a scientist, who has an American companion and a company of Indian guides.

Tumba, Bell's Indian guide, is continually on the lookout for the enemy, and after having disposed of one or two of the German's guides, comes back to inform Bell that there is no food.

Going further into the wilderness, in search of fresh food, Bell comes just in time to shoot a female cougar as she was about to jump on the back of a spectacularly dressed man who was binding the feet of the struggling cub which he had made captive. At the sound of the rifle shot, the stranger's bodyguard rushes forward, just in time to round up the enemy in the act of plundering Bell's boxes of precious collections.

The Inca—Bell soon learns that the stranger is the Inca of a hidden kingdom—takes Bell and Tumba back to his kingdom, where Bell is made a Curaca and installed in good style. Here he learns something of the history of the kingdom, meets Nona Flores, also a stranger in the kingdom, and realizes that the High Priest, Tupac, for some unaccountable reason, harbors a vindictive feeling against him. Also, ten of the loveliest maidens of the Kingdom are offered to Bell as his brides, which offer he feels it expedient to accept.

CHAPTER VI

Tupac

BELL'S domestic and civic duties kept him fully occupied. He was anxious to adapt himself to his enforced change of environment; for, although he thought of escape from New Cuzco as merely a matter of time, still he could see no immediate prospect for it. Meanwhile, life would be much less irksome if he could be a participant in it rather than merely an observer.

So he strolled about his estate every afternoon, noting with keen interest the methods of intensive cultivation, which these people had inherited from their forebears, and the great diversity of their agricultural products. This latter circumstance was accounted for by the fact that the height of the mountain rendered the climate temperate —much like the uplands enclosed between the Peruvian Cordilleras which had been the cradle of the Inca civilization.

Great reservoirs near the western extremity of the mountain, at a natural elevation some hundreds of feet higher than the remaining area, conserved the rainfall; while an admirable system of irrigation, the main arteries of which were ditches made of carefully joined stones after the ancient Inca fashion, rendered tillage possible at all times.

The Inca's fountains played the year through, so Quizta told the scientist, and there had never been a shortage of water since the days of Yahuar Yupanqui, who had engineered the entire hydraulic system. The uses of modern plumbing once made known to the progressive Huayna Capac, had been taken advantage of in the palace, and later in the establishments of the nobles.

Occasionally, to Bell's surprise, all save his household slaves would be absent for two or three days at a time. He at length inquired of the amauta the reason for this strange behavior, and was informed that all serfs were

Kingdom

PART II

David L. Fox

By Allen S. *and*
Otis Adelbert Kline

Illustrated by
BOB DEAN

The following day he spent in exploring the various underground galleries and examining the curious mummy cases. . . . After hurting his shins two or three times, he lighted a match and made his way to the far end. . . .

obliged by time-honored law to help cultivate the lands of the Sun, the lands of the Inca and the allotted tracts of the aged and sick, in the order named, besides caring for the estates of their masters. He observed, also, that the tasks performed on his premises were under the charge of overseers, each responsible for ten families.

When gathered, perishable products were immediately distributed throughout the kingdom, so Quizta told the scientist. Cereals and dried meats, dried fruits, wool and other time-resisting provisions were placed in common storehouses, to be parceled out later to every household on a *per capita* basis.

Many of the women were engaged in the spinning of thread and the weaving and dyeing of cloth. The very finest fabrics, Bell learned, were for the Inca and his household; those a shade less fine, for the Inca and Curaca nobles; and the coarser cloths were destined for general use or storage, according to the need.

Everywhere there were evidences of patient, unremitting toil. The people seemed happy and content, singing weird, barbaric chants as they went about their work, and performing their allotted tasks without complaint.

Each day, Quizta came to provide instruction. The methodical mind of the scientist soon grasped the structure of the Inca language, and he added daily to his vocabulary. When a fortnight had passed he was able to converse on every-day topics with the amauta in his own tongue; and he delighted in testing himself further by talking with his overseers.

ON the first three days of each week, in compliance with the Inca's command, he attended the morning audiences. Sometimes he had an opportunity for a greeting or a friendly word with Nona Flores, encountering her by chance in the environs of the palace. After each of these occasions a hope, only half comprehended, stirred within him. But his duties were so exacting that he did not choose to seek more of her companionship, resting content to await a more convenient season.

Aside from the fact that they afforded him an opportunity to improve his comprehension of the spoken word, the audiences of the Inca were a bore to him. The elaborate deference shown the sovereign by his subjects, the pompous ritual and the strange images, soon grew all too familiar and ceased to hold his interest.

On the third day of his third week of citizenship in New Cuzco, the audience in the throne room had been particularly tiresome, and Bell was glad when the last suppliant presented himself before the Inca. He glanced around him curiously to see whether signs of ennui were apparent on the faces of any of the stoical Indians. When his eyes rested on Tupac, the Villac Vmu, he was surprised to see that the High Priest, usually stolid and sullen, seemed highly excited, fidgeting about on his massive throne.

Tupac was striking in appearance. His skin was slightly darker than that of the Inca, and his wrinkled, hawk-like features were rendered ferocious, almost hideous, by two feathers protruding from the cartilage of his nose and by two massive golden discs stretching his pierced ear-lobes almost to his shoulders.

His closely cropped hair, its jet black streaked with gray where it showed beneath his priestly headgear, proclaimed him well past middle age; while his gaudy robes, of a pattern worn only by the Villac Vmu, adorned a tall, spare figure that gave the impression of tremendous latent energy.

The shadow which would end all audiences for the day was rapidly creeping toward the throne, and Bell surmised, as he saw the High Priest bite his lips in exasperation, that Tupac himself desired an audience with the man who was only one degree higher in the realm than he.

Finally, the last case was disposed of, and there still remained a few inches of sunlight above the burnished golden plate. The Villac Vmu hastily removed his sandals and, taking a light burden on his back, descended from his own throne, walked to a position in front of the Inca and awaited the monarch's pleasure with bowed head. Bell forgot his boredom; for it seemed to him that this servile custom, when extended to include the mighty Villac Vmu, possessed entertainment qualities of a high order.

"What boon does the noble Tupac desire this morning?" asked Huayna Capac.

"Only to crave Your Majesty to remember his generous promise made a year and a half ago," humbly answered the High Priest.

"You mean regarding the new gold service for the temple? It is being wrought by the royal goldsmiths, and will be completed in time for the feast of Raymi."

"It was not of the golden vessels I wished to speak, for I am well aware of the explicit orders Your Majesty has given concerning these. The subject of my petition is of much less importance to the state, but one which concerns me vitally as an individual. Your Majesty will recall having promised me the hand of the beautiful Nona Flores in marriage, and as the marriage day is but three weeks off, I venture this personal reminder in order that the matter may not be overlooked as it was last year."

Bell half rose to his feet, urged by his seething indignation to give Tupac the lie, but restrained by the thought that surely he had not heard aright. The Inca, meanwhile, had begun to answer the Villac Vmu; and the scientist, first scanning the nearest faces to see whether any had marked his hasty action, sank back in his chair to await the outcome with such patience as he could command.

"The hand of Nona?" inquired the calm, unhurried voice to which Bell had grown accustomed. "Ah, yes, we well remember the promise, and the word of the Inca once given is never broken. Even so, we have had genuine occasion to regret our former attitude of sanction. It seems that the radiant one is repelled by the idea of marriage, and it is contrary to our desire that she assume the bonds of wedlock against her will. We have many beautiful maidens, Tupac. Would not another do just as well?"

"Your Majesty, there is no maiden in the realm who can fill her place for me."

Underneath his assumed humility, a note of impatience was discernible in the High Priest's voice. The Inca's tranquillity, however, remained unaffected.

"Come, come, Tupac," he said. "You may have several of our fairest maidens—a dozen if you wish—only release us from this rashly made promise. Surely, so much loveliness will more than compensate you for the loss of this frail girl."

A flush mounted to the temples of the Villac Vmu,

and he but ill concealed the angry gleam in his eyes. His voice quivered slightly as he replied:

"Your Majesty's most humble servant shrinks from causing the slightest displeasure. In spite of that fact, I can only reply that a dozen—nay, a countless multitude—of the most beautiful maidens in the world could not tempt me if their price were the loss of Nona Flores."

If the Inca was offended, he gave no sign by word, gesture or expression. Bell, horrified at this sordid bargain driven by the High Priest, waited breathlessly for Huayna Capac's response. It was placid and measured as before:

"Very well, Tupac. Our word shall be redeemed on the marriage day."

CHAPTER VII

The Slave of the High Priest

THE scientist and his aboriginal instructor were at their lessons. It seemed, however, that Bell could not concentrate on what Quizta was saying. He was unable to banish from his mind the thought of Nona's impending tragic marriage.

The amauta, after having patiently repeated a phrase for the tenth time, finally said:

"Is my lord indisposed today, that he does not hear the words of Quizta?"

"To tell the truth, good teacher," answered Bell in the language he had been so assiduously studying, "I do not feel perfectly sound. Suppose you conduct me to the lady that heals, to the end that I may have the source of my ailment disclosed."

"Ah, my lord, far be it from me to displease your lordship, but you have asked of me that which I dare not do." Genuine fear manifested itself in voice and gesture. "I can, however, conduct you to the High Priest, who is also a great healer—although some say"—he glanced about to see whether any of the household servants were within hearing—"that his power is not half so great as that of Nona Flores."

"I am not of a mind to change practitioners at this time," replied the scientist. "She nursed me through a long sickness, and I owe her my very life. If she healed me before, why then should it be forbidden that she heal me again? Talk reasonably, Quizta."

"You speak truth, my lord, and fortunate it is for your lordship that the lady that heals has found a cure for the terrible *curari*. She has saved not only you, but also many of my own people from certain death."

He paused for a moment, but noting Bell's impatience, resumed:

"Has my lord not heard that Nona Flores is betrothed to Tupac, and that they will be united by the Inca himself on the national marriage day after the manner of our people?"

"Of a surety I have heard it, Quizta," answered the scientist sharply. "Perhaps you will be good enough to tell me what this has to do with the matter at hand. Has she lost her power to effect cures because of this coming marriage?"

"The Villac Vmu has issued orders that no one may seek a healing from her without permission from himself. The power of Tupac is exceeded only by that of the Inca. To disobey his edict is to court death."

"Let us then hasten to the Villac Vmu," was the eager response, "and obtain permission to visit the lady."

"Ah, my lord, that again would be quite impossible."

"You speak in riddles, Quizta. I can see no reason why such a petition should be refused."

"You force me, my lord," answered the amauta, "to disclose more than I had intended." Again he glanced around, continuing in a lowered voice: "The High Priest took a violent dislike to your lordship when you were first brought into the palace, unconscious. He not only requested the Inca to have you put to death, on the plea that you might escape and disclose the secret kingdom to the world, but when this was refused, he even bribed a servant to poison your drinking water. In some way, the lady that heals got wind of the plot, and frustrated it by causing every servant who brought water to your room to partake of it and remain for fifteen minutes. When the man who brought the poisoned water refused to drink, she called the guard, and the servitor was executed soon afterward at the Inca's order."

Bell betrayed no excitement at this startling news. He was learning to mask his feelings almost as well as the monarch himself.

"Quizta," he said, "you are an able teacher and a skilled gatherer of news. Tell me this: Was the Villac Vmu accused by his hireling?"

"Not so, my lord. He did not betray the High Priest, but it is common knowledge that Tupac was back of the whole affair. You can readily see now, can you not, why it is impossible that he will suffer you to visit his betrothed?"

"Granting that your ears have heard the truth in this matter," answered Bell, "I will visit her without his permission."

THE amauta was horrified. He declared vehemently that he would not be a party to any such rash undertaking, and attempted to dissuade the scientist from his purpose.

"I do not ask you to accompany me," Bell said, in reply to his protestations. "Only tell me how to find her suite in the palace. I will attend to the rest alone. Come, my friend, it is but little that I ask of you."

Quizta at first demurred, but after much urging, and upon the exacting of a promise that if detected Bell would never reveal the source of his information, he yielded finally and gave minute instructions for finding Nona's quarters in the great palace of the Inca.

Bell slipped his automatic under his mantle, and with this and his Curaca's sword as his sole weapons, set out in the direction of the palace. As all members of the nobility were permitted entrance to that edifice at will, he had no trouble in slipping into the hallway on which the amauta had told him Nona's suite was located. Finding the exact door, however, was more of a problem; but at length, after a careful count based on Quizta's instructions, he lightly rapped on the one which, according to his calculations, was Nona's.

A listless voice from within said, "Come."

He opened the door and, stepping quietly within, closed it after him. Lying face downward on her couch, a perfect picture of dejection, was the girl he sought. Puzzled by the fact that she did not change her position, he walked to her side and gently laid his hand on her hair.

She turned and recognized him with a start of surprise.

"Why, *Señor* Bell, it is you. I thought one of the servants had entered. Don't you realize that you are

risking your life by visiting me? Have you not heard the edict of the Villac Vmu? You must leave quickly before anyone comes."

Bell ignored her questions.

"You look pale and wan," he commented severely. "There are shadows under your eyes, and you have been crying. Tell me, do you love this Tupac?"

"I . . . I . . ." she faltered.

"You do not love him, do you?"

"N—o," faintly.

"Then why, in heaven's name, are you going to marry him?"

"Because it is the command of the Inca, and the command of the Inca is the law of the land."

"Nona," said Bell, conquering his native shyness because the situation demanded that he do so, "I have come to tell you something. I did not fully realize it until today, but I love you, girl. I love you with the deepest devotion, and nothing else matters if I may have the assurance that you——"

"No, no. You must not say that, *Señor* Bell. Remember, I am betrothed to the High Priest."

But even as she forbade him, her glorious eyes spoke otherwise, and he possessed himself of her soft, little hand and pressed it to his lips. She murmured a faint objection.

"The Inca has arranged my domestic affairs, also," said Bell. "I am bespoken by six dusky maidens, myself. But that makes no difference. Won't you give me the right——?"

"*Señor!* What are you saying?" The protest was spoken softly, but with repressed emotion.

She lay with head thrown back, eyes half closed and lips slightly parted and trembling. He drew closer and her hot breath fanned his cheek. She met his ardent gaze unfalteringly at first—then her eyes went down.

"Nona. God, how I love you!"

Her arms were about his neck—her warm lips against his. The rest of the world might go hang.

SUDDENLY the door opened and a man entered. The startled lovers saw that he wore the trappings of a servant of the High Priest. Observing Bell, he halted in the middle of the floor, puzzlement plainly written on his face.

Nona was the first to regain composure.

"What is this?" she asked scornfully. "Does the noble Tupac consider me already his wife, that his servants take the liberty of entering my rooms without knocking? What have you to say for yourself? Shall I report you to the Inca?"

"O lady, I rapped on the door," answered the slave. "I swear by the face of the blessed Moon Mother I rapped, and hearing no answer I concluded you were out, but tried the latch to make sure. It easily gave way, and before I realized it I was in the room."

"What brings you here? You have a message from your master, I presume."

"My noble lord sends you this"—handing her a heavy diamond necklace of great beauty—"with the request that you wear it as his love token on the marriage day."

While the messenger was speaking, Bell edged carefully around toward the door. He had observed a look of malicious cunning in the eyes of the native at sight of a man in the room, contrary to the orders of his master, and that man making love to the High Priest's future wife. Turning to depart, the slave found Bell barring the way.

"Be not so impetuous, O vassal of Tupac," said the scientist in the Inca tongue. "Now that your mission is accomplished, pray do not leave thus unceremoniously."

Suddenly, and without a hint of warning, the man whipped out a wicked looking knife and sprang at the scientist. The onslaught was so quick and violent that there was no time to draw a weapon. Bell was obliged to resort to strictly defensive measures. A second later they were rolling over and over on the floor.

The American was strong, but this native was the most powerful man he had ever encountered. At the first leap he had secured a hold on the scientist's windpipe which the latter, still convalescent from his recent illness, found himself unable to break, especially since he was obliged to occupy one hand in holding the threatening knife away from his body.

The throttling grip was taking its toll. Struggle as he would, Bell knew that his senses were rapidly leaving him. Tiny lights danced before his eyes. His strength ebbed. The slave felt the weakening fingers relaxing their hold on his wrist, and with a savage cry of exultation wrenched his knife hand free. He was about to plunge the blade into the heart of his intended victim, when his triumphant shout ended in a gurgling gasp, and he pitched forward on his face.

Bell, who had closed his eyes, mutely awaiting the death blow, now looked up in bewilderment after feeling the body of the other slump down beside him. He met Nona's anxious eyes; then saw the bloody poniard clutched in her right hand.

"Come," she said hurriedly, "let me help you to get up. You must leave at once."

Bell rose to his feet with considerable difficulty.

"You have saved my life . . . again," he whispered. "How can I ever repay you?"

"By leaving this place. You are still in danger."

"But what about you?" he asked, pointing to the dead body. "I will wrap it in a blanket and take it with me."

"No, no. That would never do. You would be stopped before you had gone fifty feet. Leave it to me. I have a plan. I will simply tell them that this man attacked me and I killed him. No one can deny my story. There is no witness, no circumstantial evidence."

She turned away shudderingly from the messenger whom she had silenced forever, and dropped the reddened dagger.

"And now it is good-by," she said haltingly, "for I know I shall never be allowed to behold you again."

Seeing the tears that glistened on her silken lashes, Bell caught her in his arms. The fire and vigor of his strong body returned to him as he held her close.

"Nona," he said, "you are not going to marry Tupac. Be assured of that, once and for all. I will try to find a way to hide you on the national marriage day. If I fail in that, the High Priest shall die before he calls you wife.

"Since we are not permitted to see each other, we must arrange a meeting place now. Meet me by the great statue of the llama in the palace garden on the evening of the feast of Copac Raymi at nine o'clock. Wear clothing and shoes suitable for rough travel. Will you come?"

"Ah, gladly," she said. "As long as there is the faintest hope, I grasp it as a drowning man clutches at

seaweed, for I, too, have resolved that I shall never be Tupac's wife. If worse comes to worst, the fate of that slave shall be mine also . . . by my own hand."

CHAPTER VIII

The Feast of Copac Raymi

ANOTHER week slipped by, bringing with it the day of the great feast of Copac Raymi.

Bell rose early, having slept but poorly if at all; for he knew that before nine o'clock that night he must find a way to save Nona from the clutches of Tupac. He was spurred on by the consideration that, although during the week just passed he had devised plan after plan, he had eventually been compelled to reject each one as futile.

When he passed through the house it seemed deserted, until he reached the dining hall, where a single servitor awaited him.

"Where are all my people?" he asked.

"They departed long since for the temple of the great Lord Sun," the man replied.

"But they have prepared no food," said Bell, feeling the need of bolstering up his strength for the exertions which might await him. "Are they entirely unmindful of their master?"

"Be not angry with them, my lord," answered the man. "It is a long established custom and a law of the land, that every person, bond or free, is to forsake his usual occupation on the great feast days. His Majesty will provide ample food for all."

Noting the fellow's suppressed eagerness, and guessing that he was anxious to be away, Bell commended him for his loyalty in remaining after the others had gone, and bade him be off and enjoy himself.

Bell decided that he would occupy the time until daylight in seeking out some breakfast. The larder was amply stocked, and he had about completed a satisfactory meal when there came a knock at the door. He went to open it, and found that a servant in the livery of the royal palace stood without. He bade him enter, and inquired his business.

"My lord," said the servant, making obeisance, "I bear the greeting of His Majesty, the Inca, and the command that your lordship present yourself with the young men of the Curacas at the appointed time, to take part in the ceremonies of initiation."

Bell was alarmed, for he feared the upsetting of his and Nona's plans. However, he calmly bowed his assent.

"At what hour will the young Curacas present themselves before His Majesty?" he asked.

"Immediately after the noble young Incas have been received, my lord, which will be not long after the rising of the great Lord Sun."

Greatly relieved, Bell decided to accompany the messenger on his return to the city. When they arrived they found the streets thronged with the eager populace, although the day was only beginning to dawn. The servant went his way to the palace and Bell attached himself to a group of nobles of his own class, catching something of the holiday enthusiasm of those about him.

A rosy glow appeared in the east, and a hush fell upon the expectant throng. All that could find standing room had already crowded about the entrance to the temple. Every eye was turned toward the High Priest. He stood ready, keen stone knife in hand.

Just as the great red orb appeared, he plunged his sacrificial blade into the heart of a black llama; then held its dimming eyes toward the sun until the last convulsive movement was over. Dropping the body of the victim, he extended his hands toward the sun and prayed in a voice that reached to the very outskirts of the listening crowd. After this he set about quickly flaying the animal and cutting up its flesh.

He handed the pieces to his attendants, who still further divided them with stone knives and distributed the fragments among the multitude. The raw, warm morsels were eaten by the favored recipients on the spot.

This done, the Villac Vmu washed his hands, donned a richly ornamented robe and led a chanting procession toward the east, the throbbing cadence of voices and the measured tramp of feet accompanied by the shrill notes of double reed instruments.

BELL did not join the followers of this procession, but stationed himself near the palace gates. He saw now that the High Priest and his train had halted, though the barbaric chanting and piping continued. Then the Inca himself, seated on a gleaming golden throne upon a platform borne by two dozen slaves, took his position at the head of the column amid the acclaim of the people, and once more they moved toward the rising sun.

What further ceremonies ensued Bell could not see, nor did he greatly care. Not wishing to attract attention to himself, he stepped into a side street to await the return of the people, and when they came back ere long, mingled with them and once more made his way towards the gates of the palace.

The young Incas of the royal household appeared a little later. Having reached the proper age, they had accomplished their fastings and tests of skill and strength, and now awaited public recognition of their attainment to the rights and privileges of manhood. The monarch came forth and addressed them briefly, after which he said to his retinue:

"We shall do that which remains to acknowledge them men before us all."

He then pierced the ears of each candidate with a golden bodkin and invested him with a beautifully wrought scarf, a pair of cloth slippers and a garland of flowers. Attendants conducted them to an inner chamber for further ceremonies in charge of Inca nobles.

The young Curacas, who had endured the prescribed trials successfully, were next inducted by means of the ceremony decreed for those of their station. The Inca scanned the group until he saw Bell, whose stature and fair hair distinguished him from his companions.

"Noble Curaca," he said. "You have proven to our royal satisfaction that you are possessed of both courage and skill, through your defense of our own person against the dangers of the forest."

A murmur of approval ran through the listening throng.

Taking a salver of sacred bread from an attendant, the sovereign was about to advance for the purpose of dividing a portion with the new white Curaca in accordance with the hoary custom of the Incas, when Tupac, the High Priest, broke the silence of the breathless multitude with——

"Your Majesty, I protest against this violation of the ancient laws and customs of our nation. The white stranger, despite his heroic preservation of your royal

person, has not stood trial of strength and dexterity as decreed by our traditions."

With changeless expression the Inca, having first glanced at Bell, replied in the monotonous tone that marked his every speech:

"We had not thought it necessary, O worthy Tupac, in view of his recent demonstration of both, with a goodly portion of valor thrown in. However, we do not believe our erstwhile defender would be averse to such trial. What say you, noble Curaca?"

Bell smiled and shrugged.

"It matters not to me, Your Majesty," he answered.

Again Tupac interposed.

"If Your Majesty will permit a further suggestion," he said, "may I propose that the white Curaca be permitted to try conclusions at wrestling with one of our athletes?"

Again the Inca surveyed Bell.

"While our noble white Curaca appears to be no weakling, it is not the custom of his native country, as it is in ours, for all to learn the art which every man among us has practiced since childhood. It is possible that, under the circumstances, he may choose to vindicate his right to the title of Curaca in some other manner."

His questioning eyes had held those of Bell for but a moment when the latter, to the surprise of all, replied:

"The arrangement suggested by the noble Tupac is quite satisfactory to me, Your Majesty. Though I wrestle but indifferently among the athletes of my own country, I am not entirely without experience in this sport, as Your Majesty has so graciously intimated, and may at least be able to afford some entertainment to the multitude."

"Spoken like a man," said the Inca, who, unaware that Bell had been the wrestling champion of his university, feared that he might make a sorry showing against the poorest of his athletes. "And now to choose an opponent. I appoint——"

HE was looking at a stripling—a comparative novice who, he thought, might be a reasonably even match for the scientist—with the obvious intention of selecting him, when Tupac again interrupted.

"If it please Your Majesty," he said, "I propose that the white Curaca meet Ripac. They are quite evenly matched in size, and should show us a worth-while bout."

There was a look of guile in the eyes of the High Priest, which did not escape the notice of Bell, as a burly individual, fully half a head taller than the white man and with thews so mighty that the muscles of the scientist, powerful though they were, appeared almost childlike beside them, shouldered through the crowd amid cries of approval from some and of protest from others.

Bell noticed that the words of sanction came mostly from the members of the crowd who wore the livery of the High Priest. Others shouted, "For shame! It would be no match. Ripac would break him like a dry reed. It is not fair to pit our champion against one of lesser strength and experience."

These latter being in the majority, the sagacious Inca noted that the crowd was with him and held up his hand for silence.

"It would indeed be unfair to pit a man of lesser experience against the mighty Ripac," he said. "I therefore appoint Corac," indicating the stripling, "who will oppose the white Curaca."

There were looks of dissent from many of the High Priest's followers, and Tupac himself ill concealed his chagrin, though he dared not openly oppose the edict of the Inca. The multitude in general, however, did not seem greatly moved, either to favor or to disfavor, by this announcement; but an abrupt change was apparent in the attitude of all the spectators when Bell surprised them by addressing the Inca thus:

"It is most thoughtful of Your Majesty thus to accord me the opportunity of meeting one of your lesser champions. However, if it please Your Majesty, I should prefer the more exacting test proposed by the noble Tupac."

A thunderous shout of approval shattered the moment of tense silence which followed his words, and it was some time before even the Inca could make himself heard.

"Are you aware, noble Curaca," he asked, "that Ripac is the mightiest wrestler in New Cuzco—that he has easily overcome the ablest contenders for his title?"

"Some hint of his prowess has just now been revealed to me through the attitude of the people, Your Majesty," replied Bell.

"And this does not deter you?"

"No, Your Majesty."

A murmur of applause from the now tense auditors was heard.

"Very well. You shall meet Ripac."

The man whom the Inca had named stepped forward, a look of disdain on his brutal countenance. Bell noted that the features of Tupac lighted up for a moment with an expression of triumph, before he could compose them to the mask-like calm that marked his usual demeanor.

CHAPTER IX

Six Fiancées

AS soon as the Inca announced that he should meet Ripac, champion wrestler of New Cuzco, Bell laid aside his mantle. A ring was cleared on the turf, around which the gaping natives pressed as closely as they could. Praise of Ripac was heard from many, but shouts commending the bravery—the sheer audacity—of the white man came from every side. There were conjectures, too, some of which were audible to the scientist, as to how quickly the Inca champion would subdue his smaller opponent.

The pair stood facing each other, waiting for the royal command to proceed.

"Are you ready, noble Curacas?" inquired the calm voice of the Inca.

"Ready, Your Majesty," both replied.

"Then proceed, and may the great Lord Sun look with favor on the better man."

The spectators strained forward, watching for the rib-cracking hug which they knew to be Ripac's favorite hold and with which they had seen him maim many an opponent. Then they gasped with amazement as they saw the white man easily elude the outstretched hands; saw him move with cat-like quickness and seize their undefeated one.

Although it was a hold well known among wrestlers of the outer world, it was new to the secret kingdom. With the same motion with which he bent and eluded those powerful, gorilla-like arms, Bell had applied the tremen-

dous leverage of the crotch and half-Nelson. Ripac was swung aloft as easily as if he had been an infant.

The eager onlookers gasped again, thinking their champion would be hurled to the earth with bone-breaking force, but breathed with greater ease when Bell dropped him to the ground without great violence.

Instead of following up the advantage which might have given him an easy victory, Bell drew back and allowed the astounded Indian to arise. The crowd surged in about the pair to watch the outcome, and Ripac, his chest heaving with suppressed rage, extended his brawny arms and charged with a bull-like bellow, apparently determined that this time the elusive white man should not escape him.

Bell did not avoid the outstretched hands. Instead he seized one sinewy forearm and turning, brought it over his shoulder. A quick heave and Ripac, describing a none-too-graceful arc, alighted on his back with a thud and a grunt some distance from his fresh and still smiling adversary.

Once more Bell allowed him to regain his feet, but in this instance assumed the rôle of aggressor. Leaping in before Ripac could even try for a hold, he seized a thick wrist and simultaneously tripped the giant with a scissors-like movement of his legs, throwing him prone on the ground. The astounded spectators then saw Bell bend the thick wrist back and up, seize the other as Ripac groped in a clumsy effort to break the hold, and force both huge hands along the spine toward the bulging neck.

With clenched teeth and brutal features contorted by the pain of that muscle-straining hold, Ripac endeavored to shake off his opponent. The more he struggled the higher Bell pushed his enormous paws, until blood from his bitten lips mingling with the foam that issued from between his clenched teeth, he groaned:

"Enough."

Instantly releasing the twisted arms, Bell, to the accompaniment of deafening applause, assisted his weakened opponent to arise. When the shouting had subsided the Inca, turning to Tupac, asked:

"Is there need for further testing?"

Compelled to admit that there was none, Tupac mustered what grace he could, while the Inca, amid further shouts of approval from the multitude, broke sacred bread with the white Curaca before conferring this mark of favor and acceptance on the other candidates. Ripac, less versed in guile than the High Priest, brushed the people aside and departed, glowering and muttering threats against his conqueror.

The scientist was becoming more impatient with each passing minute. He urgently desired an opportunity to slip away and find a means to thwart the High Priest's designs upon Nona Flores.

He scarcely knew whether to be glad or sorry about the Ripac incident. He had certainly won the approval of the populace, but at the same time he had no doubt made a powerful Curaca his enemy. He looked to the Inca for a sign that the ceremonies were at an end.

"Noble Incas and Curacas," said the sovereign, "the people will be faint with hunger, if food be not soon provided. O Tupac, servant of our Lord Sun, do thou give order that the feast be brought forth."

The High Priest hastened to the temple, where Bell could see that a procession was ready formed. The Inca was borne to a place at the head of the line, the people stripping branches from the trees and clearing a wide path down the center of the street. As the monarch and his train approached, they strewed branches and flowers across the way, at the same time intoning a subdued chant.

Bell observed that several figures were seated on massive thrones atop a great platform, next in line after Huayna Capac. As this litter passed, he gave a start of surprise at seeing mummified faces beneath the gorgeous head-dresses and dead men's hands resting on the arms of the golden thrones. Following these came a long line of slaves carrying trays, baskets and jars of food and drink, and a great quantity of golden utensils.

Someone placed a hand on his arm, and he turned to find Quizta beside him.

"My lord is amazed," said the amauta, "and Quizta has sought him out in order that he may not be found wanting as an instructor. These that you have just seen are the departed Incas who have reigned in New Cuzco, together with their Coyas. There are among them a few more ancient still, who were hidden from the accursed Spaniards and brought hither."

"What is the meaning of this procession?"

"They will pass through all the streets of the city, after which the feast will be spread on tables in the great square, and the people will eat and drink from the bounty of the Inca in the name of his ancestors."

"Thank you, Quizta. All this is new to me—strange and interesting, but there are certain matters that I should attend to at my estate. Will my further presence here be required?"

"My lord, all personal business is foregone on the great festal days. When His Majesty has given the people his blessing, he will return to the palace and preside at the repast provided by him for the Incas and Curacas. My lord's absence from this latter occasion could scarcely pass unnoticed."

"And you, Quizta?"

"I go to eat with the people in the great square."

As the amauta disappeared in the crowd, which was now turning toward the place of the feast, Bell cursed the circumstances that had made him a Curaca instead of one of the common herd.

How easy it would have been to slip away, had he not received this special mark of the Inca's favor. However, seeing no alternative and hoping that the festivities would not be greatly prolonged, he turned his steps towards the palace.

Arrived there, he was conducted at once to the great banqueting hall and shown to his place by an attendant. He found to his considerable embarrassment that he was seated in the midst of a group of six comely maidens, whom he quickly recognized as his fiancées. All of them were casting shy and admiring glances at him. At a loss what to do or say because of his ignorance of the conventions of the land, he mastered his confusion as best he could, and took to surveying his surroundings.

The long, low table about which the nobility reclined on luxurious cushions occupied a central position lengthwise of the hall at one end of the room. At the other end, and elevated several steps, was a similar table, somewhat smaller and placed crosswise of the hall. Here Bell saw the Inca nobles assembled. Near the head of the board sat Tupac and—his heart dropped a beat—beside him Nona Flores. He experienced a pang of jealousy as he observed that they were engaged in animated conversation.

A functionary stationed at the door announced, "The Inca comes." Immediately the buzz of voices ceased, and

A quick heave and Ripac, describing a none too graceful arc, was flying through the air

every person rose. As the monarch appeared, followed by his Coya and concubines, all knelt to do him homage. The scientist followed their example.

"Arise, noble Incas and Curacas," said the familiar even voice of the sovereign.

He had advanced until he stood near Bell, and now came directly toward him.

"It is our pleasure," he said, "to present to our new citizen with due formality the maidens who are betrothed to him."

As he named them one by one, with a brief reference to her noble lineage, each one took Bell's hand in turn, kissed it and pressed it to her forehead. He thought of nothing appropriate to say, so kept silence. Evidently this was just what was expected of him.

The Inca and his women passed on to their places at the upper table, and, at his signal, the banqueters were all seated. Servants brought sumptuous viands in great quantity and variety, and filled the golden cups with chica, the native brew, and rich red wine.

Now that they had been duly presented, the six maidens lost some of their shyness. Bell found them to be witty, intelligent and discreetly curious. He tried with all his power to enter into the spirit of the occasion, to uphold his part in the table talk, and to keep his eyes from straying too often toward the girl he loved.

When, however, he noted the air of proprietorship with which the High Priest regarded her, he cast discretion to the winds. More than once, as the banquet progressed, the sharp glances of the two men clashed like hostile blades.

Presently the haravecs, or poets, entered and recited their heroic tales in celebration of the exploits of the Incas, past and present.

When Huayna Capac finally arose and dismissed them, Bell left the banquet hall with a heavy heart, pondering how he might deliver Nona from that most terrible of menaces, Tupac.

CHAPTER X

At the Statue of the Llama

IT was nearly noon on the day of the feast of Copac Raymi when Bell left the banquet hall. Upon inquiring of a friendly Curaca, he learned that there would be other prescribed celebrations throughout the remainder of the day, with a torchlight procession at night.

On account of the short time left to him, he knew that he must work rapidly if he were to find a way to rescue Nona. Desiring seclusion above all things else, therefore, he set off in the direction of his estate, moving at a leisurely pace in order to avoid attracting attention to himself.

He found that none of his retainers had come back from the city and was grateful that, although half the day had been wasted, he would have the place to himself at least.

Pondering the weighty problem that confronted him, he made his way to the vineyard and wandered about among the rows of hardy vines, paying but scant attention to the ripening fruit, which gave promise of an excellent crop. Arriving at the end of the vineyard, he suddenly brought up against a single row of grapes which had been planted straight across and at right angles to the rest.

Turning, he walked aimlessly along the trellised and thickly-vined end-row, still deeply preoccupied; then reached out abruptly to grasp a woody stem for support. He pulled himself to a sliding stop, realizing that his errant feet had nearly carried him over the edge of the cliff.

He peered cautiously down, and saw that the rocky walls rose sheer and smooth. A small stream a thousand feet below him gave back the rays of the sun, and he marked a herd of llamas as they approached the water's edge to drink. They looked no larger than flies, so great was the distance.

He turned back from the cliff and noticed that the odd row of vines extended parallel with it, approaching at places within three feet of the edge. He was proceeding along this narrow pathway when his attention was attracted by an eagle, soaring toward a point in the cliff a little lower than where he was standing. The bird of prey carried a small animal in its talons. Bell looked below for a landing place, but could see none. There was not a shelf or crevice visible for more than a hundred feet—in fact, the surface was in some places actually concave.

Watching the eagle curiously, he was amazed when it apparently flew directly into the solid wall at a point about thirty feet below him and disappeared from view. He waited patiently until the feathered scourge of the air launched forth, and flew away with empty talons.

There was a reason for his loitering now. The significance of this happening had smitten him suddenly and forcibly. There must be a cave or hole of some sort in the rock—an aperture which, judging by the unhesitating manner in which the eagle had approached, would be large enough to admit a man. At least, it would bear investigation.

He walked back to his villa, and, finding the place still void of inhabitants, entered to seek out his camping equipment. He removed a light, tough coil of plaited fibre from one of the boxes, laid aside his outer garment and wrapped the entire rope about his waist. When he had again put on and fastened his cloak, no one would have guessed that he carried anything unusual concealed about his person.

For caution's sake, he strolled casually back through the vineyard. When he was again behind the vines on the cliff's edge, however, his leisurely manner disappeared. Quickly uncoiling the rope from about his waist, he made one end fast at the base of a thick grape vine and went down hand over hand.

Having descended what he thought to be about the proper distance, he sought a footing upon the smooth face of the precipice, and shortly was rewarded by feeling his toes catch on a firm ledge. At this promise of repayment for his efforts, he lowered himself more slowly, meanwhile working his body inward with a walking motion.

Suddenly he felt a sharp blow on his shin, quickly followed by a half-dozen more. The mother bird had evidently returned during his absence, and was protecting her home. Bell, stubbornly determined to complete his investigation, kicked out viciously, slipped, experienced an uneasy moment of precarious balance and then found himself sprawled on the floor of a small cave. He could dimly discern two moving objects in the murky interior, presumably the eagle and one of her offspring.

His leg smarted from the onslaught of the angry bird's sharp beak, yet he did not want to kill her, unless it should prove absolutely necessary. He edged a little farther into the cave, but the eagle took this for an offensive movement and flew at him with a scream of rage, talons extended to strike.

Bell avoided the attack by throwing himself quickly to one side, and the furious defender's momentum carried her outside and a full fifty feet beyond the opening. Rushing to where the eaglet cowered in a corner, the usurper seized it and threw it from the cave.

On looking out, he saw what he had anticipated would take place. The mother bird swooped down beneath her falling, fluttering progeny. Catching the helpless thing deftly on her back, she flew swiftly away and was soon a mere speck on the horizon. Familiar as he was with the ways of these creatures, the scientist was certain that she would not seek to reclaim her lofty domicile.

He turned to examine the chamber. It was about twelve feet deep and perhaps ten wide. The floor was strewn with bones and covered with filth. The half-eaten remains of a freshly-killed agouti, a rodent about the size of a rabbit, lay near him.

Bell cleaned house, as best he could, by scraping the litter from the floor with his sword and pushing it out the doorway. Then he climbed back up the rope, went some distance along the edge of the cliff and returned with a huge bundle of dried grass. He pulled up the rope and attached the bundle to the end, eased it down and descended once more to the cave. Drawing the grass in after him, he released it and shook it down in one corner of the room. When he had repeated these labors several times, a soft and comfortable couch was the result.

His next concern was for provisions. The sounds of revelry reached him faintly from the city, and he saw no one approaching along the road. Still, there was need for extreme watchfulness. He would run no risk of having his precious secret discovered. Accordingly, he made several trips to the storeroom and back, carrying small quantities of food under his clothing, and watching carefully for returning servants. Though none appeared, he took the further precaution of pulling up the rope and concealing it each time he left the cliff. Consequently, it was late in the afternoon when he completed his task by depositing two large skins of fresh water in the chamber.

That evening, as Nona prepared to meet Bell in the garden, her heart was filled with anxious forebodings. To the accompaniment of terrifying thoughts, she donned clothing suitable for rough travel, as Bell had suggested.

"What if we are discovered?" she asked herself. "What if Tupac's men should see us?"

She knew all too well what the awful consequences would be. Bell would be taken and executed, and she—no doubt they would keep her in close confinement until the morrow. There would be no escape for her from the fate she most abhorred—the seraglio of the High Priest.

When she stole quietly out through the door of her apartment, her courage almost forsook her. She hesitated for only a moment, however, nerving herself to walk slowly along the hallway and down the steps leading to the garden. As she made her way toward the meeting place, two figures detached themselves from the shadow of the palace wall and stealthily followed.

Arriving at the statue of the llama, she waited breathlessly. It was just nine o'clock, but no one was in sight. O, why didn't he come? What could have delayed him? Fortunately, the great torchlight procession had drawn the populace to the other end of the city. They ought to make good their escape at once.

Each minute seemed like an hour. A thousand apprehensions tortured her. Had something happened to Bell? Perhaps the High Priest had learned of their plans and had caused him to be slain from ambush.

A tall form approached her, a shadowy outline among the trees and shrubbery. She rushed forward with a glad little cry of welcome—then stopped with an exclamation of terror. The man was Tupac.

Instinctively she shrank back against the base of the statue. He stood before her, a smile of gloating triumph on his demoniac features.

"So," he said, "once more you would avoid the ceremony on the national marriage day. You are attired for a journey. Very well, we shall journey together."

In an instant he had seized her about the waist. She attempted to scream, but he clapped his hand roughly over her mouth and dragged her, vainly struggling, into the shadow of the trees.

CHAPTER XI

A Place of Refuge

DELAYED as he had been by his preparation of the cave in which he planned to conceal Nona, Bell hurried apprehensively toward the square; for he was already late, and the action of his tardiness on his nerves was momentarily on the increase. He rushed breathlessly through the unpeopled streets until at length, with his objective before him, he paused in dismay.

The trysting place was as deserted as the empty streets through which he had just passed. A great fear gripped his heart—all the more terrible because he had no idea where to turn or what to do.

The sound of a gruff voice, followed by a woman's scream in the shrubbery at his right, suddenly arrested his attention. He would know those voices anywhere—the guttural tones of Tupac and the terrified cry of Nona Flores.

Parting the thickly grown bushes, he saw by the dim light two forms struggling in a small clearing. He crossed the intervening space in a single bound, and flung his arm beneath the chin of the taller figure.

Bereft of breath by the encircling arm, Tupac attempted nevertheless to draw his sword; but a hard fist, driven with tremendous force, crashed against his jaw again and again. His knees sagged. A moment later he was hanging, a limp, dead weight.

Bell flung the unconscious body from him and bent over the prostrate form of the girl.

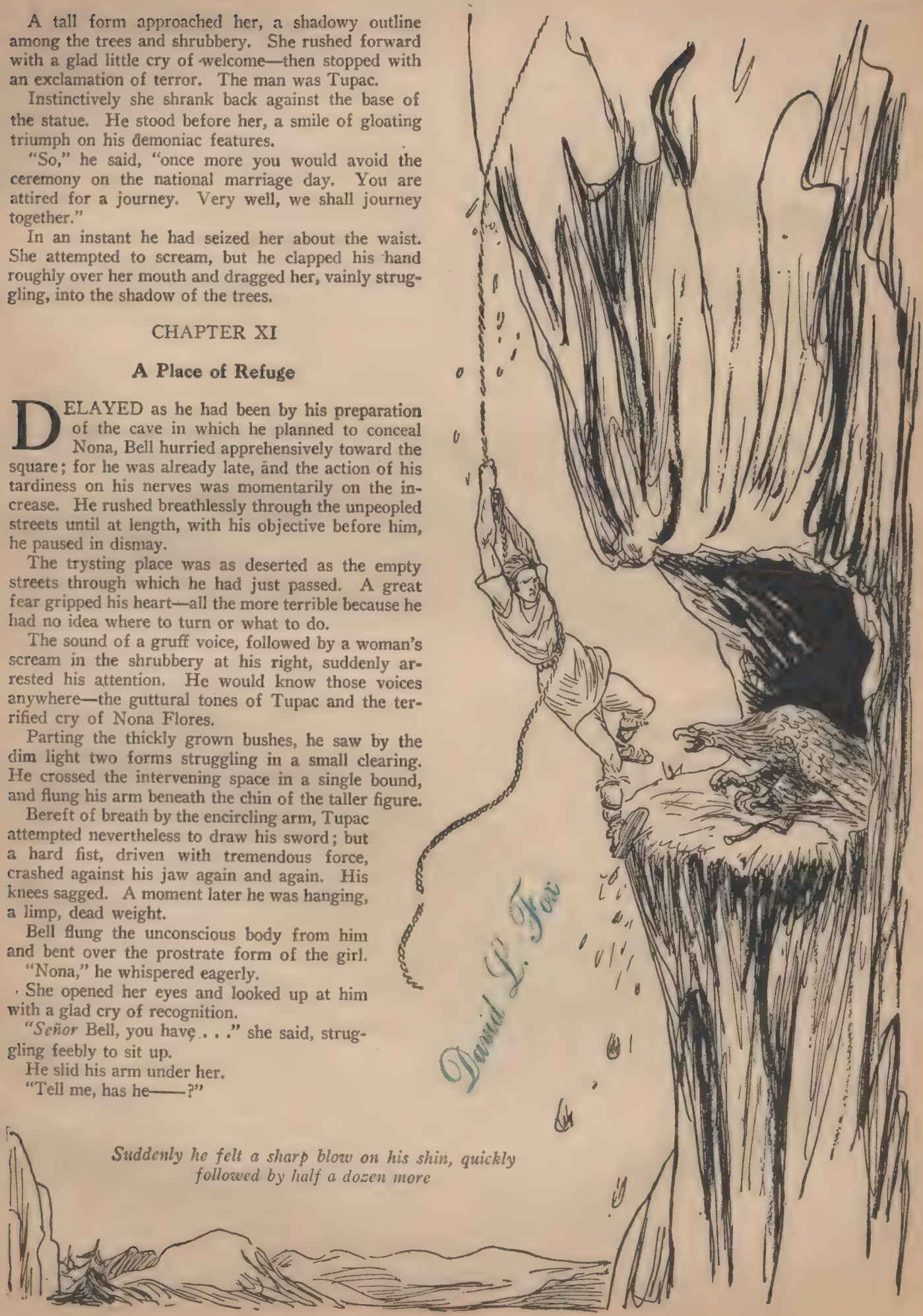
"Nona," he whispered eagerly.

She opened her eyes and looked up at him with a glad cry of recognition.

"*Señor* Bell, you have . . ." she said, struggling feebly to sit up.

He slid his arm under her.

"Tell me, has he——?"



Suddenly he felt a sharp blow on his shin, quickly followed by half a dozen more

She shook her head and smiled weakly.

"Thank God!" he exclaimed fervently. "Let us be off at once. We have no time to lose."

Though she still felt dizzy and faint, Nona managed to scan their surroundings with watchful eyes. Thus it was that she detected a movement amongst the bordering shadows.

"Quick!" she cried. "There is someone behind you!"

Her warning came none too soon, for as Bell turned two men sprang at him from opposite directions. One went down in an instant with a swift uppercut to the jaw; but the other, who was far more wary, was not to be subdued so easily.

He circled lightly about the big American, looking for an opportunity to strike with his long, keen-edged knife. Bell, wishing to end the contest quickly, drew his Curaca's sword and hurled it with all his might. The savage dodged aside, so that the weapon shot past his head and crashed into the bushes. This swift evasion inflicted its penalty, however; for he tripped on a projecting root and fell headlong.

Immediately there was a fierce struggle on the ground, the outcome of which was dubious; for while the white man was the stronger and heavier of the two, the Indian was exceedingly cunning and agile. They rolled over and over, grunting, snarling, clutching, clawing. If one gained the advantage, he promptly lost it again through some quick movement of his adversary.

The scientist found it exasperatingly difficult in the half darkness to get an effective hold on his sweating, slippery opponent. The fellow had an uncanny way of eluding him. In addition, he retained his dangerous knife, which must needs be guarded against.

Meanwhile, the man who had taken Bell's uppercut was recovering consciousness. The sounds of the mêlée may have hastened his return to normal. Soon he stole towards the two on the ground. Once within striking distance he bent over them, dagger in hand, awaiting an opportunity. Nona, perceiving the new danger which threatened her lover, secured the sword of the High Priest and crept up behind the crouching aborigine.

The opening he sought presented itself to the second man when Bell, with a powerful heave, flung the other on his back and grasped the sinewy throat. The battle would have ended then and there, but just as the savage was preparing to plunge his blade into the back of the American he heard the snapping of a twig behind him. Wheeling swiftly, he faced Nona. There was derision in his throaty cry as he reached for her, not perceiving that she was armed. She lunged blindly with the sword; then stepped back just in time to avoid the falling body.

Quickly reaching Bell's side, she found him cursing and plunging the Indian's knife again and again into the lifeless form. For the moment, a primitive rage had completely unbalanced him.

She laid her hand on his shoulder.

"Come," she whispered. "We must go. He can harm us no more."

At the touch of her hand the madness left him. The gory knife dropped from his trembling fingers and he rose unsteadily, his breath coming in quick gasps.

They went to where the other Indian lay and found him on his face, stone dead. The blade of Tupac's sword projected from his back, having been driven in to the hilt by his fall.

Bell now turned his attention to the High Priest. The scoundrel showed signs of coming to, so the American bound and gagged him securely with strips torn from his own garments.

They left the garden warily, and were soon treading the thoroughfares of the city. Street lights were unknown in New Cuzco, and the friendly darkness enveloped them. However, the ruddy glow far behind grew steadily brighter, and they knew that the torch-bearers were returning to the great square. Here, Nona informed her companion, they would quickly disband and take their several ways to their homes, for this was the end of the great feast of Copac Raymi.

The situation still demanded the utmost stealth, although haste was equally imperative. Onward they went, through streets and lanes, past small houses set closely together, by the more pretentious homes of the nobles, through a succession of gardens, orchards and vineyards, until finally they stood at the edge of the cliff. After a twenty-minute search in the darkness, Bell found the spot for which he was seeking.

After he had uncoiled the rope from about his waist, the American secured one end to the thick grape vine he had used previously and stood waiting for an inspiration. Nona's whispered words of gratitude and relief had ceased some time before with their agreement to maintain as nearly complete silence as possible. Now Bell's problem was to get her into the cave. She could not shin down the rope as he had done, and he dared not risk carrying her down for fear that it might break with their combined weight.

He finally hit upon the scheme which appeared to be the only feasible one. A short conference was necessary, despite the attendant hazard. They decided that he should tie the rope under her arms and let her down slowly until she could get her feet into the cave opening and thus gain access by the method which Bell had employed that afternoon. This plan was put into execution, and he swung her carefully over the brink and gradually lowered his precious burden, with a prayer that the rope might hold.

Soon he felt the strain lessening, and a moment later she called to him softly that she was safely in the cave. He then threw the rest of his slack over the cliff, and a moment later was with her in the cavern, untying the hard knots, which had held her in the descent. After hanging his mantle over the entrance and lighting a candle, he showed her where the provisions were, and they sat down on the humble couch he had constructed.

"Are you afraid to stay here by yourself, Nona?" he asked.

"I feel safer here than I ever felt in the palace of the Inca," she replied. "No, I am sure I shall not be frightened, but it will be terribly lonesome."

"Indeed it will," he agreed. "I wish I might come to visit you, but I suppose that will be impossible. No doubt I shall be suspected and spied upon. There are food and water here for two weeks, but if all goes well I will take you back to the palace in two days. Much will depend upon the attitude of the Inca. If I am condemned, I shall have time to inform them of your whereabouts, so there is no danger of your starving here. The marriage day will have passed for another year, and many things can happen in a year. Perhaps——"

She looked up quickly and read the longing in his eyes.

"Yes, perhaps . . . but we cannot talk of it now."

"You are right. I must get to my room without arousing my servants, in order to establish a perfect alibi tomorrow. I was delayed tonight because of my late dis-

covery of this place, along with the fact that I had to be so cautious about getting it ready for you. I shudder to think what my tardiness in meeting you might have cost —but that is all over now. Nona, while I hate to leave you cooped up in this dismal hole, I can at least be happy in the knowledge that tomorrow you will not be Mrs. Tupac."

"Ah, that makes any hardship easy to bear."

After a few pensive moments, she looked up at him archly but with the suggestion of a shadow in her eyes.

"Have you considered, *Señor* Bell, that before another day passes you will become the husband of six native beauties? I cannot say that I relish the thought."

"I have devised a way out of that situation, too," he answered. "Tomorrow I will put my plan into execution."

"It may work, but I'm afraid it won't. I am terribly jealous."

"Whatever happens contrary to my wishes, you shall have no cause for jealousy," replied the scientist, and fortified his promise with a lingering kiss.

When their farewells had been said, he extinguished the light, donned his mantle and in another minute was coiling the rope about his waist at the top of the cliff.

Everything seemed quiet and orderly within the house when he arrived. Removing his sandals, he stole noiselessly to his bedchamber. His first act on reaching his room was to remove his torn, blood-stained clothing and burn it in the fireplace. After a refreshing bath, he stretched his tired body on the bed and fell into troubled sleep, for many weighty problems still confronted him.

CHAPTER XII

The National Marriage Day

THE white Curaca's valet awakened him somewhat earlier than usual by tapping on the door.

"Come," he said drowsily, and turned over to enjoy a few minutes' sleep while his bath was being prepared.

The man bustled about with unwonted noise and alacrity, and the nap was of short duration.

Emerging from the bathroom, Bell noticed that his servant had brought him clothing of particularly brilliant hues and gaudy pattern.

"Where did you get that bird-of-paradise outfit?" he asked. "Take it back and bring me a regulation Curaca suit."

"If your lordship will permit," replied the valet, bowing humbly, "I venture to remind you that this is your marriage day. These are the customary wedding garments of a Curaca noble. It would be most improper to appear before the Inca for the ceremony in any other costume."

Bell felt like blurting out that he was not going to appear before the Inca at all, that day, but he refrained and suffered the man to fasten the resplendent apparel about him.

After breakfast he strolled out into his yard. He had noticed a specimen of the tree, *Quillaja Saponaria,* or soap-bark tree, growing there the day before and it was his intention to put it to a somewhat novel and decidedly spectacular use. The bark has been used for various purposes in pharmacy. Cutting off a portion of the bark, he went back to his room where, after bolting the door, he rummaged among his camp belongings until he found a stew pan. This he partly filled with water from the tap in the bathroom. He then kindled a small fire in the grate, cut the bark into minute pieces, consigned these to the water and put the concoction on to boil.

Soon the liquid turned a pale brown color, upon which he removed the pan and allowed it to cool. This being accomplished, he shook it and smiled as a light foam appeared on the surface. He had made a fairly good sample of Brazilian vegetable soap.

He filled his mouth with a portion of it, disposed of the balance, and packed the pan away once more after rinsing and thoroughly drying it. Then he walked out into the hallway and, on meeting a slave girl, moaned loudly, blew a quantity of froth from his mouth and fell to the floor, struggling and twisting as if in great agony.

She gave one frightened look at him, then dropped the bedding she was carrying and rushed down the hallway shrieking:

"Help! Quick . . . our master is dying. He has fallen in a fit."

Her cries brought a score of servants, and Bell was soon surrounded by an excited group of men and women. He rolled his eyes, turned his head from side to side, and now and then emitted small puffs of foam.

"The amauta!" cried someone. "Get the amauta."

Just at this juncture the worthy Quizta, the amauta, arrived on the scene. Believing the American to be in his death throes, he ordered them to convey him to his room.

Bell writhed and frothed at the mouth until his supply of liquid soap was exhausted, after which he lay as still as he could.

The amauta drove the curious servants from the room and closed the door. There was a look of anxiety on his face as he approached the bedside. Bell saw that he had a true friend in Quizta. Just now, however, he gazed dully up at him, apparently with unseeing eyes. Finally he spoke haltingly, simulating great weakness and pain.

"Will you . . . send . . . a message for me, Quizta?"

"Gladly, my lord. What manner of message may I send?"

"Please dispatch one of my slaves . . . to the Inca, with the message . . . that I regret exceedingly . . . that an illness, which prevents me leaving my bed——"

He paused, seeming to labor for breath. The sympathetic amauta bent lower over his pupil and waited for him to continue.

"Have the messenger . . . tell His Majesty that . . . this illness makes it impossible . . . for me to attend . . . the national marriage day festivities."

"It shall be done at once, my lord."

So saying, Quizta pulled a bell cord and issued the necessary instructions to the servant who answered. He then took a seat at the bedside. Bell tried to go to sleep, but finding this out of the question, simply closed his eyes and wished that the sad-faced amauta would leave.

This the latter failed to do, however, and time dragged wearily for the scientist, who hardly dared lift a finger for fear of betraying the fact that he was not a grievously sick man. After a tiresome hour of this, Bell had about decided to ask his friend to leave when a sudden commotion was heard in the yard outside. Quizta rose and went to the window.

"It is the Inca!" he cried. "The Inca is coming."

Bell now felt that it would be up to him to act in real earnest. He had not expected any such development as this. A few moments later the Inca was seated at his bedside.

"We were extremely sorry to hear of your illness, noble Curaca," he said, "but since you could not come to us, we have come to you."

"I am overwhelmed by Your Majesty's kindness," replied the American in a low voice, feigning to be almost too faint to talk.

"This marriage day has been rather puzzling to us. First the Villac Vmu and his fiancée failed to put in an appearance. Then we received your message. All of the other marriage ceremonies have been performed and the festivities are now in progress. Your own absence was satisfactorily explained, but that of Tupac and his bride-to-be remains a mystery. Neither has been seen since last evening, nor can a trace be found of either of them."

Bell was secretly elated. So, they had not found the High Priest. That meant that he had not succeeded in liberating himself. Of course he had trussed his enemy up quite well, but with never a thought that the bonds would hold so long. The picture of the pompous arch villain spending the national marriage day in the quiet seclusion of the Inca's shrubbery was so pleasing to him, that he restrained himself with great difficulty from chuckling aloud. He managed, however, to give the impression of mild surprise.

"What can have become of them?" he asked haltingly. "Is it possible . . . that they have left . . . the country together?"

"It is impossible for anyone to leave this mountain without our knowledge and permission. They are hiding somewhere nearby, but we shall not trouble ourselves about them. If they do not wish to be married, why, that is nothing to us."

The monarch clapped his hands and a number of people trooped into the room, among them the six maidens to whom Bell had been betrothed some days before. These latter came to the bedside at a sign from the Inca, whereupon he grasped the scientist's limp fingers and, taking the hand of each girl in turn, joined them in the attitude of friendly greeting.

Bell assumed that they were holding a ceremony of condolence for him and hoped it would soon be over. Formalities of any kind bored him.

The Inca arose.

"You must be weary from all this excitement, so we will leave you now with our hearty congratulations and good wishes for your speedy recovery."

So saying he left the room, followed by his courtiers and attendants. The six maidens, however, remained.

When he heard the last of the royal party leaving his house, Bell called the amauta to his side.

"What are they waiting for?" he asked, indicating the six young women who stood demurely before him.

"They await your pleasure, my lord. You will no doubt wish to assign them quarters. Shall I attend to the matter for you?"

"Assign them quarters? What do you mean, Quizta? Have they no homes? I am not running a boarding school for young ladies."

"His mind has been weakened by the sickness," thought the amauta. Aloud he said, "They had homes, that is true, but as they are now your lordship's wives——"

"My what?" cried Bell, sitting bolt upright and momentarily forgetting his feigned illness. "Why, what are you talking about, Quizta? There has been no ceremony."

"The marriage ceremony of our people is very simple," replied the amauta. "It consists merely in the joining of the hands of the contracting parties on the national marriage day by the Inca or his district governors."

Bell dropped back on the pillows. So, all of his acting had been for naught.

"Have them conducted to suitable quarters, Quizta," he murmured weakly.

CHAPTER XIII

Morea

ON the following morning, Bell was looking through his camping equipment when he chanced upon a knife of curious design and pattern. It had belonged to Tumba, the man who had been his companion on the wearisome journey through the Brazilian wilderness. He had been so busy with other matters since his advent in New Cuzco that he had completely forgotten his faithful servant, and felt not a little ashamed of his negligence as he balanced the small, keen-edged weapon in his palm.

"Truly, a sharp reminder in more ways than one," he reflected, and resolved to make inquiries regarding Tumba at once.

To this end, he enlisted the services of Quizta. No, the amauta had heard nothing concerning his lordship's servant. If a Carib, or resembling a Carib, he had probably been made a slave. In New Cuzco all Caribs were slaves. He would investigate.

Some hours later a messenger returned with the tidings that Tumba was a slave in the service of one Caxamarka, an Inca noble of considerable wealth and influence. Bell, taking a quantity of gold from one of his treasure chests, asked Quizta to conduct him to the home of Caxamarka.

When they were ushered into the presence of that noble, they found him with his quipucamayu or keeper of records, busily engaged in going through a huge pile of the documents.

"Figuring up his resources, no doubt," thought Bell. "From the size of that stack of yarn, I judge he must be in excellent financial circumstances."

Caxamarka was gray-haired and seventy, but athletic and youthful of figure. Age rested but lightly upon him. He greeted his visitors cordially and desired to know in what manner he might be of service to them.

Bell explained that, through some mistake on the part of the Inca's men, his servant had been made a slave along with the Caribs. Having heard that the noble Caxamarka was now the owner of Tumba, he had come with the wish to purchase him.

Yes, the old nobleman remembered having received four slaves from the Inca's soldiers a short time before. He would have them brought in.

A servant was dispatched. He returned some moments later with four sullen Indians. Tumba was not among them. The scientist's disappointment showed in his face.

Caxamarka was sorry—exceedingly sorry. Perhaps Tumba had been purchased by some other noble.

Quizta suggested that they question the Caribs. Possibly they would know what had become of their former adversary. Bell interrogated them in their own tongue, and one of the men replied that Tumba had been bought just the day before by Morea.

"Who is Morea?" asked Bell. "We must find him quickly."

"Why, Morea is my daughter," replied Caxamarka. "She recently came of age and has a fortune in her own right. I knew that she had acquired some slaves yesterday, but it never occurred to me that your man might have been among them. I will have you conducted to her at once."

They found the lady reclining listlessly upon a dainty couch, regaling herself with tiny cups of cocoa which a slave girl handed her from time to time. Meanwhile, she listened with a somewhat bored expression to the singsong voice of a patient amauta as he read from an old Spanish novel.

Morea longed for romance—she sought romance; but somehow it had always eluded her. Being the daughter of the third man of the kingdom, she hardly dared consider any of the lesser nobles as a possible husband; consequently she had set her cap for the High Priest. While he had many concubines, not one of them had incurred sufficient favor to be elevated above her companions as ruler of Tupac's seraglio and potential mother of his lawful heirs.

This was the place which Morea had for some time coveted and, incidentally, the distinction which the Villac Vmu had intended to confer upon Nona. When his intentions in this matter had been made known to Caxamarka's daughter, the tidings had caused her considerable anger and mortification, and she had then and there resolved to marry a man for love and to throw ambition to the winds. Up to the present time, however, love had not come to her. So far she was merely in love with love.

When she saw Bell, all this was changed. There was something about him which fascinated her—attracted her strangely. She knew not what it was, and cared less. She had triumphed at last. She had glimpsed romance, and she meant to see more of it. Could it be, after all, that she was mistaken? But no—all of the delightful sensations described by her Spanish authors were there. The wild beating of her heart when he had entered, the delicious thrill when he had touched her hand in greeting, her magnetic response to the very sound of his voice: all these convinced her that a most delightful affair of the heart had sprung into full flower in an instant.

She would have preferred that the object of her affection should be at least an Inca noble; but Bell had already been made a Curaca, and a man so altogether splendid in natural endowments should carve out a much greater place for himself amongst the New Cuzcan nobility. Perhaps before the next marriage day rolled around he would have performed some great deed on behalf of the state, and would have been rewarded by an elevation in rank.

She graciously bade the scientist and his companion be seated, dismissed her amauta and offered them chocolate. After a somewhat trivial conversation in Spanish, Bell gradually led around to the reason of their visit.

"Tumba? Oh, yes, I remember him well: the strongest and most intelligent slave among those I purchased yesterday. He is really quite valuable."

"I am prepared to pay any price you ask," replied Bell, emptying the contents of his bag of gold before her. "Take from this pile of coins a quantity sufficient to reimburse you fully. If this be not enough, I will bring as much more as you require."

Morea scarcely glanced at the heap of glittering metal.

"Dismiss your amauta and I will send my slave girl away. Matters of this kind are best discussed in private."

Although he was somewhat surprised, Bell complied by requesting Quizta to leave the room and remain outside, after which he waited for the girl to speak.

"I want none of your gold," she said when they were alone. "I have plenty of it—more than I shall ever need. You have brought the price of fifty slaves, but should you offer ten times that amount I would not touch a single piece of it."

"Am I to understand that you will not part with Tumba at any price?"

"I did not say that. In fact, I fully intend that he shall be yours, but he shall not be paid for with gold."

"Perhaps, then, there is some task you wish me to perform. In that case you have only to command me, not only because I long to have my old servant back, but because I will consider it an honor and a pleasure to serve so gracious and charming a lady."

Morea leaned toward him with sparkling eyes, her vanity touched by his gallant speech.

"I want you to take me in your arms and kiss me as the white men kiss their sweethearts," she said.

Bell was completely taken aback. Feeling obliged to spar for time, he resorted to what he considered pardonable dissimulation.

"And how is that?" he inquired. "Never having had a sweetheart, I am very much afraid that I could not qualify. Indeed, I am quite sure that I should be a dismal failure at acting the part of a lover."

As he aptly put it later, he was "between the devil and the deep blue sea." He wanted Tumba back and was willing to go to almost any lengths to get him; but the idea of kissing this half-savage girl was revolting, and doubly so when he thought of Nona.

"O, but I am sure you could do it beautifully," she replied, accompanying the words with her most winning smile. "One does not need practice for such things, according to all the books I have read on the subject. Of course, if you don't want to you needn't," she added a bit haughtily. "I will keep the slave and you may take your money and be off. The daughter of Caxamarka is not in the habit of seeking favors from a mere Curaca."

Bell rose and bowed stiffly.

"And I, though 'a mere Curaca,' am not in the habit of seeking favors from anyone," he retorted. "I came to purchase a slave who rightfully belongs to me. By your own statement, I tendered you the price of fifty slaves in payment. The gold is no more to me than it is to you. I will not trouble to take it with me. If you wish, you may keep both my money and my slave, with the guilty knowledge that you are making unlawful use of the property of another."

Morea was furious for a moment, but when she saw that he was leaving, pride capitulated to desire. Quickly rushing to his side, she placed a restraining hand on his arm.

"Do not go, noble Curaca," she implored. "I spoke hastily, thoughtlessly, and I ask your forgiveness. You shall have both your money and your man. Here." She handed him the sack, and he held it while she replaced the treasure. "I will retain only this small piece of Spanish coinage as a keepsake. Your slave shall join you immediately in the yard."

Bell felt elated over this unexpected turn of affairs. He wheeled suddenly and took her lightly by the shoulders.

"I cannot kiss you as a man would kiss his sweetheart. That would never do. I am a married man with six wives. I will, however, kiss you as a brother might kiss his sister."

So saying, he touched her cheek lightly with his lips, and was gone before she could grasp the full significance of his words. She stood looking after him, dazed by his sudden speech, thrilled by his kiss of gratitude and wondering much at his strange eccentricity. Mechanically, she summoned a servant and gave the order for Tumba's release.

A few minutes later, there was a happy reunion of master and man in front of Caxamarka's palace.

They were returning home when Bell noticed a familiar figure approaching. It was Tupac, followed by a half-dozen of his attendants. As the two parties passed on the road, the scientist saluted gravely. The High Priest's only response was a lifting of the eyebrows. His brief stare, however, was full of the bitterest malevolence. It was patent that he, at least, had guessed the identity of the man who, after effecting the rescue of Nona Flores under cover of darkness, had left him to meditate on the error of his ways in the Inca's shrubbery patch.

"Noble Curaca," said the amauta anxiously, when this little drama had been enacted, "your humble servant is again reminded that the mighty Villac Vmu is not kindly disposed toward your lordship."

"That seems quite evident, Quizta. He failed to recognize my greeting save by black looks. I have fulfilled the requirements of courtesy. What more can I do?"

"I have no suggestion, except that my lord maintain the strictest vigilance." He lowered his voice. "In New Cuzco, it is commonly held that to incur the displeasure of the High Priest is to sign one's own death warrant. When I have told your lordship such things as I know concerning his methods, you will recognize that your peril is a very real one. The Villac Vmu not only has practically unlimited civic power, but in addition he controls an efficient spy system which keeps the populace in abject terror at the mere mention of his name. Among the common people, the name of Tupac is usually pronounced in a frightened whisper, with the admonition, 'Be careful, for even the ground has ears.'

"Many believe that he possesses supernatural powers by means of which he is enabled to know, at all times, everything that is being said and done in the kingdom. Those who oppose his will meet with imprisonment, torture or death. If his enemies are too powerful to be attacked openly, there are other ways. Only a few weeks ago, an Inca noble was rash enough to express his disapproval of the Villac Vmu. He died suddenly and mysteriously. There was a rumor that he had been poisoned, but the investigations which were made discovered nothing, and the matter was quickly hushed up."

"Quizta, I thank you for this new evidence of your friendship and concern for me. I shall be on my guard."

While the amauta talked, he had been giving more than half of his attention to troubled thoughts about Nona. He saw that, now Tupac's suspicion was apparent, he would have no time to lose in getting the girl back to the palace. Without doubt the High Priest would strike suddenly, secretly and effectively. It would be folly to leave her in the lonely cavern, when the only one in possession of her secret might be slain at any moment. He therefore resolved to go for Nona that very night.

Upon his return home, Bell sat at the table for the first time with his six newly acquired wives. "The Sextette from Huayna" he called them, in an effort to meet with good humor a most unpleasant situation. They were all daughters of Inca nobles and spoke Spanish fluently, so there was no lack of conversation. He joined in amiably enough, maintaining, however, a certain amount of reserve and dignity which forbade undue familiarity. They seemed to take his partial aloofness as a matter of course, which at the time surprised him, although he learned afterward that this was the demeanor generally affected by heads of households throughout New Cuzco.

They listened, wide-eyed and wondering, to his descriptions of the part of the world from which he had come, and plied him with incessant questions, many of which would have seemed childish to a person unacquainted with the fact that they had always been so circumstanced as to gain but meager knowledge of any part of the outside world.

Bell retired after dinner to what he termed his library, there to enjoy a cigar while transcribing some notes which he had made that day; for, in spite of the predicament in which he found himself, he was still the scientist at heart. Even though biological investigations were now, perforce, a hobby rather than an occupation, his manuscripts had been enriched by many pages, at odd times, during his enforced residence in New Cuzco.

He had written but a few lines when the "Sextette" came quietly in. The girls distributed themselves about the room in various comfortable and home-like attitudes, and each took from a beaded bag that she was carrying, some unfinished work with which to occupy herself. Bell noticed that the one nearest him was making fillet lace, while the others seemed to be embroidering sundry small articles of apparel.

Not wishing to appear rude, and yet feeling a little vexed at this calm introduction of domesticity into his workroom, the scientist resumed his task without a word of greeting.

His wives tactfully forebore from conversation in order not to disturb him.

A half-hour of writing, and his notes were all transcribed and the papers put away. He turned, and his eyes fell on Mirim, the one who was making the fillet lace. She looked up quickly.

"Will it please my lord to be entertained this evening?" she asked.

Bell was puzzled how to answer. He had intended going to his room, but realized that it would be several hours before he could venture to take Nona from the seclusion of her cave. Meanwhile there was nothing to do but to wait.

"What sort of entertainment?" he inquired.

Mirim seemed surprised at his question.

"We have been taught to sing, to play stringed instruments and to dance." she replied.

He thought of Nona, passing the monotonous hours out there in the lonely cavern. No one was entertaining her. Why should he make merry?

"Some other time," he said. "I am still a little unwell from my stroke of yesterday, and must retire early."

"As my lord wishes, replied Mirim.

He stood watching them for a moment as they strove to hide their disappointment in closer application to their needlework, and a great pity for the cloistered women of New Cuzco tugged at his heart. Then he bade them a cheerful good night, heard their responses and went upstairs to his room.

CHAPTER XIV

Prisoners of Tupac

ON reaching the seclusion of his chamber, Bell immediately sent for Tumba. After closing and bolting the door, he told his faithful servant in simple terms the things which had befallen since his arrival in the city. He was especially careful to impress upon the Indian the power, cunning and resources of his enemy, the High Priest. He then disclosed his intention of sending his guide on a scouting expedition about the premises in search of lurking spies.

Tumba was eager to start at once, but Bell would not let him go until shortly after midnight. In twenty minutes' time, he was back in the room.

"Did you find any spies?"

The scout held up one finger.

"Ah, you found one, did you? Where is he?"

"He dead," replied Tumba in a matter-of-fact tone, producing a sharp knife with a significant red stain in the blood channel.

"You have been too hasty, boy. I did not want him killed. I only wished to give him the slip. We must throw the body over the cliff at once. If Tupac learns that you have killed one of his men, we'll be in a devil of a mess."

Tumba led the way to the body of the slain prowler. Suddenly he stopped and laid his hand on Bell's shoulder, enjoining silence. They approached warily and saw that two men were bending over the deceased, talking excitedly in the Inca tongue. It appeared that they had just discovered their companion and were endeavoring to ascertain who had killed him. Bell heard one utter a sentence in which were the words "Villac Vmu", then start off at a trot while the other stood guard over the body.

"We must act quickly," whispered Bell. "He is going to warn the High Priest. I guess we'll have to get rid of this fellow now. Think you can do it, Tumba?"

"Me get um, all right. You walk straight up to um. Me go other way."

Bell waited until Tumba had a start of a few minutes, then sauntered directly toward the spy without any attempt to hide the sound of his approach. The man, upon hearing him coming, crouched with knife in hand, ready for deadly action. Bell advanced steadily, as if totally unaware that he was being ambushed.

It was an old ruse, but it worked well. The spy, concentrating his attention on the approaching figure, neglected to look elsewhere. The trap was sprung. The knife of Tumba drank blood for the second time that night, and soon each of them was dragging a body toward the brink of the cliff.

After fifteen minutes of disagreeable and strenuous labor, the two dead spies were disposed of. Master and man hastened at once to the point above the cave.

Bell leaned over the cliff and called softly. There was no answer. His heart leaped to his throat. What could have happened to Nona? He called again. Then, with a surge of relief, he heard her reply.

Swiftly preparing the rope, he made it fast to the much-used grape vine, and was soon in the cave. After an affectionate greeting, he prepared at once for Nona's departure, relating meanwhile the adventures of the evening.

"We'll have to work fast, I'm afraid," he concluded. "No doubt Tupac's spy will have a young army down upon us in a short time."

He made the ascent in his customary manner and, with the assistance of Tumba, quickly lifted the girl to the upper level. Then, coiling the rope about himself, as formerly, he led the way toward New Cuzco, making a detour in order to avoid possible reinforcements for the High Priest's snoopers, of whom he supposed there were others holding his premises in furtive surveillance. When they had passed through several plantations and all danger from attack seemed averted, he dismissed Tumba, thinking that it would be better for them to reach the palace unattended.

As they proceeded cautiously, Bell unfolded to Nona the events which had taken place since he had hidden her in the cave. She did not seem surprised when he told her how he had unwittingly acquired the "Sextette" at the very moment when he was congratulating himself on having evaded matrimony by playing sick.

"Of course," he hastened to add, "you know I will not recognize this absurd ceremony in any way, other than by permitting the girls to live in my home. Circumstances compel me to do that much."

"I am sure that you couldn't have done otherwise," replied the girl, "nor do I blame you in the least; but the thought of your having six wives, even though they be wives in name only, is a rather disquieting one. I can't help feeling that some of them are going to fall in love with you, in which case I shall become terribly jealous, for they will employ all of the arts known to womankind to win you—arts against which the strongest resolutions may avail you nothing. The man who can resist the wiles of a clever, beautiful woman is a rarity indeed."

"I agree with you," he replied, "nor do I claim that immunity; for there is one woman on this great rolling planet of ours who could easily twist me around her little finger. But there have been no others, nor shall there ever be another. I need not name this one woman."

For answer, she pressed his hand in the darkness.

"We should be pretty near the edge of town by now," said Bell. "I hope we haven't come the wrong way. What the——?"

Something whistled through the air and twined around his legs. The momentum of his body threw him forcibly to the ground. Rising somewhat awkwardly, he slipped his sword from its sheath in time to face a half-dozen men, who rushed in on them from all directions. He laid about him savagely with the stout blade, well knowing that this unequal fight could have but one end, while Nona crouched on the ground beside him, almost paralyzed with fright.

He heard the whistling noise again and something wound about his throat. Hampered as he was by the close-wrapped bonds that pinioned his legs, he lost his precarious balance. The back of his head smote the hard earth with considerable force. Instantly a savage was upon him.

Nona screamed with terror as she saw the Indian plunge his knife into the breast of the prostrate man. The fellow seemed bent on out-and-out murder. He had raised the dagger to strike again when one of the ambushers, who seemed to be in command, caught his arm and emitted a few sibilant words of admonition.

In a moment more, Bell and Nona were securely bound. Each was placed on the back of a horse. They were conveyed, not toward the city as they supposed they would be, but directly away from it.

Bell was weak and faint from the wound in his chest, which throbbed with pain at every step of the horse. Had it not been for the coils of rope about his body, the knife would surely have pierced his heart. The tough fiber had saved his life, temporarily at least.

What was it that had tripped him, and later encircled his throat? Ah, yes. It must have been a bolas, a peculiar sort of lasso or rather sling, used by the South American Indians. Instead of a running noose, it was equipped with two leaden balls, and these natives could use it fully as effectively as the North American cowboy throws his lariat.

They had journeyed for fully half an hour when the leader turned into an enclosure and stopped before a small adobe building. There were but two rooms in the house. Bell was placed in one and Nona in the other. No doubt their captors would send for the High Priest, he thought, and this time there would be no chance of escape. He would probably be tortured and killed, and Nona. . . he shuddered at the fate in store for her.

He strained desperately at his bonds. Finding his utmost efforts unavailing, he cursed and ground his teeth in helpless rage.

CHAPTER XV

Fed to a Boa

SEVERAL hours after Bell and Nona had been thrust into their adobe prison, the scientist heard the sound of galloping horses and guessed that Tupac had arrived. Someone opened the door of Nona's room. The agony and the fury of that moment seemed to give him superhuman strength. The rope which held his arms parted, and a moment later he had freed his feet and was listening at the door.

He tried the fastening cautiously and it yielded beneath his hand. Peering through the slender aperture, he made out a group of men and horses a short distance away. A single guard stood in front of the building. At the moment, the fellow was faced away from the door, carrying on a shouted conversation with one of his companions who had charge of the horses.

Swiftly and silently Bell stole out. The door of Nona's prison chamber stood wide open, and he could see a figure moving about within. An instant later, he recognized the intruder as Tupac. Weaponless though he was, due to the precautions taken by his captors, Bell sprang at the throat of the High Priest, who gave vent to a choking gasp as the white man bore him to the floor.

"What have you done with the girl?" he hissed. "Tell me quickly, or you shall never speak again."

Tupac rolled his eyes in terror and amazement.

"By the sacred locks of Chasca, I swear I have done nothing with her. I have not even seen her," he babbled.

"You lie, damn you, but this lie shall be your last!"

With this, he tightened his grip on the throat of the Villac Vmu, thinking despairingly: "I cannot save her, but I can at least avenge her."

Then something struck him a crushing blow on the back of the head, his grip relaxed and he lost consciousness.

When he recovered his senses, Bell tried to peer about him. Everywhere was inky darkness. Had he gone blind? He rose unsteadily and groped here and there. His hands came in contact with cold, moist stone. Exploring with his fingers, he sensed the unmistakable touch of metal, flat and with round projections at regular intervals—a studded iron door, he decided. As nearly as he could tell, the frame was about three feet wide. To comprehend the scope of his quarters in this fashion required but a short time. He was in a tiny cell not more than six feet square, unfurnished save for the low stone bench which he had occupied. The place was damp and musty and reeked with horrible odors. The walls were slimy and seemed to ooze moisture. In view of the slowness with which his giddiness and nausea were abating, the captive judged that he probably had been lying in a stupor for hours.

In a room situated about fifty feet above Bell's dungeon, the High Priest was conversing amiably with one of his henchmen.

"You say the boa is very savage, Ripac?"

"He has not been fed for two weeks, my lord. I fully believe he would attack even a horse."

"It is well. Let us get the white man."

Ripac called two guards, and the four men descended a winding stairway which terminated abruptly before an iron door.

Bell had been listening to their approach. A moment later, he heard the characteristic janglings which result when a selection is made from a bunch of heavy keys; then the grating of a rusty lock. The door was flung open, admitting just enough light to assure him that he still had the use of his eyes.

The presence of Tupac infuriated the prisoner, and it was with difficulty that he restrained himself from leaping at his enemy. Guards seized him by either arm. Ripac led the way upstairs, while the High Priest brought up the rear. When they reached the head of the stairs, Bell balked.

"Where are you taking me?" he asked, "and by what authority do you make prisoner a free subject of the Inca?"

"You will learn soon enough. Do not pull back. To resist is useless. I can summon a hundred men in an instant," and the Villac Vmu emphasized his speech by prodding Bell with the sharp point of his sword.

They turned into a passageway, rather brightly lighted with hanging oil lamps fashioned of metal, and halted before a narrow sliding door. Ripac produced a key and opened the barrier a trifle. The High Priest peered in, then quickly drew back as something struck from the inside with great violence.

"He is growing anxious for the meal that awaits him, Ripac. We must end the delay very shortly. It is cruel to prolong the pangs of his hunger."

"Just as you say, my lord. Shall we thrust this dirty white meat in now?"

"In a moment. I would have a word with the carrion first." He turned to Bell. "Behind that door is a hungry boa constrictor. No doubt you have seen boas in your travels through Brazil, but I dare say you have never beheld so mighty a reptile as this one. I understand that you are a naturalist—that you take great interest in the study of plants and animals. No doubt, if I were to tell you that a boa could swallow a man, you would take exception to my statement. This might lead to a dispute, and disputes are distasteful to me. I prefer proofs to arguments, always. You will therefore be placed in this room with the gentle creature. If he swallows you, I win the discussion. Should he be unable to do so, I shall have to grant the correctness of your viewpoint.

"When he sinks his sharp fangs into your flesh, reflect on the folly of a man who would steal the bride of the Villac Vmu. As his coils tighten about you, first driving the breath from your body, then crushing your bones and finally reducing you to a soft, shapeless mass, repent of that selfishness which led you to abduct the intended wife of another man, although you yourself were to be blessed with six wives.

"The boa, if he survives the filthy meal of which he is about to partake, will be our wedding present to the lady that heals. No doubt she will love him very dearly, for your flesh shall become his flesh, and I am informed that she has a strong affection for you.

"But enough. In with him, Ripac!"

The villainous Curaca, evidently much pleased at the predicament of the man who had made him look like such a sorry wrestling champion, smiled evilly and stooped down to open the door. Bell wrenched one of his arms free and with his liberated fist struck the other guard to the floor. He ran swiftly down the hallway, but only to encounter two more men.

He might have escaped even then, had it not been for the fact that the High Priest blew a shrill whistle which called a mob about him, against which he was unable to hold out. He was dragged back by two husky Indians. Ripac opened the door. A push from behind sent him sprawling almost on the boa. The door clanged shut.

Tupac stood listening for a few moments to the struggle going on behind the door. A look of gloating satisfaction spread over his repulsive face. Then he strolled leisurely away in a most pleasant frame of mind.

WHEN Bell had dismissed Tumba on the way to the palace some hours before, the latter had not gone back to the estate as his employer thought. Instead, he had followed them at a distance.

He knew it was useless to take part in the fight when Nona and Bell were attacked and captured. Nevertheless, he believed that he might in some way be able to effect the release of the prisoners.

Upon seeing them placed in the adobe hut, he stole around to the rear of the building in the hope of finding a window or door unguarded, but there was no opening of any kind. Feeling along the base of the wall, his hand came in contact with a rat hole. The animals had dug their way under. Why not he?

As Tumba had only his knife and his hands for excavating purposes, the labor was necessarily tedious and would have been most discouraging to a man of less dogged persistence. He was handicapped, too, by having to work noiselessly, for the least sound would have betrayed his presence to the sentry on the other side.

Nona was lying in a semi-stupor on the floor, bound hand and foot, when she was partially aroused by a gentle scratching immediately behind her. She thought at first that a colony of rats must be burrowing there, until someone whispered the name of Bell.

"Who is it?" she answered guardedly, now thoroughly alert.

"Me, Tumba, come save you. No be 'fraid."

Quietly he slid through the opening and cut her bonds.

"Where Bell?"

"He is in the next room. Do you think you can dig under the wall and get to him?"

"Me try."

With this, Tumba set to work industriously on the dirt floor, Nona helping as best she could.

Suddenly they heard a party of horsemen come up. Tupac had arrived. Tumba ceased his digging.

"No time get Bell now. Come."

He pulled her through the small opening, only a few seconds before the High Priest entered the room. The pair immediately started off in the direction of the city, taking care, however, to avoid the route by which they had come.

Arriving finally at the palace, Nona determined to make a clean breast of the whole affair to the Inca and implore him to rescue her lover.

He granted her a private audience and listened to her story with his usual Sphinx-like expression. She made no mention of the cave, but merely stated that Bell had hidden her on his plantation, after frustrating the abduction plans of the brutal Villac Vmu.

In spite of his unperturbed expression, the Inca was none the less inwardly indignant at the atrocities of Tupac. By his order, a party of horsemen was dispatched under the guidance of Tumba to rescue Bell from the adobe hut. They returned with the tidings that a careful search, not alone of the building but of the surrounding area as well, had proved absolutely fruitless.

Nona was frantic. She besought Huayna Capac to send an order to the Villac Vmu for her lover's immediate release. The messenger came hurrying back with the news that Tupac had left the mountain on a hunting expedition, and that no one in his house knew anything about Bell.

By this time, the Inca was nearly as concerned about the American as was Nona. He dispatched men to search the city as well as every other spot on the entire mountain top.

It was Nona's opinion that the High Priest had taken Bell with him when he had gone on his hunting trip. The Inca thought this improbable, but put her theory to the test by sending a cavalry squad in pursuit.

A day and a night of fruitless search ensued, during which time Nona neither ate nor slept. The monarch caused heralds to go throughout the kingdom proclaiming cessation of the morning audiences until further notice, and devoted his attention to directing the quest for the scientist. On the second morning, Tupac returned with the Inca's men.

He admitted that he had taken Bell to his home. Pressed for further particulars, he added that the white Curaca had been left in the custody of Ripac with instructions to hold him prisoner.

"Since when has Ripac turned warder of your private dungeons?" asked the Inca with as much of scorn as he ever permitted to show in his voice.

The High Priest averted his eyes and muttered an unintelligible reply. His haughty self-assurance returned to him promptly, however.

"Your Majesty," he said with dignity, "I have but exercised my lawful prerogative in this matter. The white Curaca is said to be a breeder of sedition. It was with the utmost regret that I ordered his detention, in view of Your Majesty's graciousness toward him. Still, I saw my duty as a protector of the realm and acted accordingly. My men have orders to treat him with the greatest courtesy, pending investigation of the serious charges which have been lodged against him."

"Peace," replied the Inca. "Our present interest is in finding our lost citizen."

(*Continued on page* 755)

A Tale of the Future

The Moon Woman

By Minna Irving

MOST of our authors, thus far, have been more or less pessimistic of the future. Just why this should be so, we cannot say. Our new author, however, shows nothing of that fear. Rather, she sees a considerable amount of improvement several thousand years hence. Even effectual communication with another planet does not phase her. If the problem of indefinite suspended animation could be solved, we wonder how many people would lend themselves to such an experiment, even with all chances in their favor.

We are sure you will agree with us when we say "The Moon Woman" is a beautiful story.

Illustrated by WALLIT

In a Winged World

PROFESSOR JAMES HOLLOWAY HICKS was thirty-five when he discovered the wonderful serum of suspended animation. By injecting this marvelous fluid into the veins, a living body became practically dead and remained so for a certain length of time without undergoing the processes of decay.

When the serum ceased to act, the apparently dead man would revive and take up the thread of life again where he left it, and as well as ever. The period of suspended animation was governed by the quantity of serum injected into the blood.

Professor Hicks had repeatedly demonstrated the perfect success of his great discovery on dogs, cats, rabbits, mice, and even on horses, but for obvious reasons had failed to find a human subject. Though he offered a large reward to any man or woman willing to be "made dead" for six months or a year, no one could be found courageous enough to risk it. Even would-be suicides shied at the test, preferring to travel to the next world on a high-speed ticket, or by the popular gas-route, to taking chances with an unknown drug, which might for all any one knew (even Professor Hicks himself) bind the body in the chains of pseudo death but leave the brain alive—truly a frightful condition to contemplate.

So after vainly advertising for a subject, and even canvassing the park benches at night in the hope of persuading some wretched creature to lend himself to the glorious cause of science, the professor decided to try it on himself.

One blustery March night found him seated in his handsomely appointed library ready for an excursion in death. Opposite him sat his friend, Dr. Horace Blinkman, and upon the carved teakwood table between the two men lay the black box containing the serum in a small vial and a little hypodermic syringe filled for the supreme test.

Outside in the bitter wind the professor's luxurious limousine waited at a side door to bear him away to his temporary tomb.

Professor Hicks was clothed in a long, loose robe of fine white woolen stuff, fleeced inside with lambs-wool of a sufficient thickness to protect his inanimate body from freezing hard in winter in the damp cold atmosphere of the marble mausoleum which he had built especially for this great experiment.

His affairs had been put in order a few days before, and in case of his death occurring through any unforeseen contingency, such as some unsuspected freak of the serum, he had made a will leaving his entire fortune to Dr. Blinkman. The doctor needed it; his own scientific experiments had drained his pockets without adding to his reputation, and more than one loan-shark and pawnbroker was acquainted with his shuffling step and

To the professor's amazement, she floated up to the roof like a bird or a gigantic butterfly. From her shoulder blades extended broad wings of a glistening, semi-transparent, membranous material

slovenly figure. He had borrowed heavily, too, from Hicks, and had been living on the professor's bounty for months.

The clock struck twelve—the hour appointed for the experiment to begin. Professor Hicks rolled up his loose woolen sleeve, revealing a white and muscular forearm, and Dr. Blinkman picked up the fateful hypodermic and poised it above the large vein at the wrist.

"Two punctures," instructed the professor calmly, "each injection will last for six months. A year will pretty thoroughly prove to the world the immense value of my serum. You are to occupy this house during my absence. One year from tonight at exactly twelve o'clock you will come to the mausoleum with my attorney, one other gentlemen of science chosen by yourself, and several members of the press to witness my triumphant resurrection. Now goodby."

Dr. Blinkman gripped the professor's extended hand, jabbed the needle twice in his wrist and the thing was done.

"I will compose my limbs on the davenport," remarked the professor, "so that you may be better able to observe the action of the serum, and take careful notes."

He stretched himself upon the richly upholstered couch and crossed his hands upon his breast. A valuable ruby on his little finger winked malevolently in the clear flood of light from the electrolier. Already a deathly pallor was stealing over his smooth-shaven cheek, and his eyes were fast losing their accustomed brilliance.

"I feel as though my limbs were going to sleep," he murmured drowsily, "there is a prickling sensation all over me, and a numbness. Horace, I—am—so—sleepy."

His voice died away in a whisper, his faint respirations became slower and slower, and at 12:15 he was to all appearances stone-dead.

Dr. Blinkman closed his ancient silver watch with a snap and laid his hand upon the professor's brow; it was damp and cold. He lifted one of his hands and it dropped limply from his clasp. He held a small pocket-mirror to the blue lips and the clear surface of the glass remained undimmed. There was no pulse, and not the faintest flutter of the heart could be detected. Any coroner in the land would have pronounced Professor Hicks as dead as a door-nail.

DR. BLINKMAN stood regarding the inert form with knitted brows. What if he were really dead? It would mean great things to him, all this ease and luxury would be his as the professor's sole heir. Yet he knew the apparently lifeless man before him was not dead. He knew he would return to life at the appointed time. He had assisted at too many experiments with the serum on animals to doubt it. His own setter dog had been dead and was alive again none the worse for three weeks siesta in the professor's laboratory. The vial glittering on the table caught his eye.

What if he should administer a little more—enough to make the professor sleep a little longer, say five or ten years? That would leave him in undisturbed enjoyment of this splendid mansion and the income from certain stocks and bonds long enough to complete some experiments he had under way, and so put him on his feet in the scientific world. Professor Hicks would think his reckoning had been wrong.

But would he? Had he not proved the exact duration of the serum too many times to be fooled? The professor was a "square man," loathing deceit, despising trickery, and utterly incapable of a dishonorable action himself.

He would denounce him without mercy if he played any tricks on him. He remembered, too, that each puncture must be made in a different place, and the tiny scars would reveal his perfidy.

The doctor paced the room, his hands clasped behind him, black temptation wrestling with his soul.

A year of this luxury, and then to return to his dingy lodgings in Harlem with their faded brown curtains, worn leather chairs, and tattered rugs; once more to be hounded by the loan-sharks, to make furtive rounds of the dusty pawn-shops again, to beg for time from the slatternly landlady—his whole being revolted at the thought of it all.

It would be lifting a man into Heaven for a brief time, then plunging him into the depths of Hell forever.

His bloodshot eyes raged over the *de luxe* editions that lined the walls on three sides, the costly desk-fittings, the rare bronzes, the marble figures guarding the doorway with its sweeping curtains of heavy brocade. He gazed at the humidor with its expensive cigars; his mind traveled to the cobwebbed bottles in the cellars, the gray limousine with its Turkish upholstery and silver vase always filled with fresh flowers now waiting outside, and from the bottom of his treacherous heart he fervently wished the still form on the davenport was really dead, that all these luxuries might be his, not for a few fleeting months but for as long as he lived.

It would be easy to inject any one of the deadly poisons in the laboratory into the veins of the unconscious man, and the long sleep would become the sleep of death.

But each poison left its damning evidence behind, and murder is an ugly word. He was ghastly pale, beads of sweat glistened on his forehead and his knees shook under him.

He picked up the vial of serum, trying to guess the operative power of the fluid it still contained. The oily stuff gave off an opalescent shimmer as he turned it this way and that in his trembling fingers.

Within that tiny crystal cylinder lay his future. It would not be murder—not if all Professor Hicks claimed for it was true. The professor would simply sleep on for a number of years, ten or twenty according to the amount administered, and wake up at the end of that time safe and sound with all his faculties unimpaired. Meantime he would revel in the luxuries he coveted, and would have the means and leisure to conduct the costly experiments in cancer-cure that he felt sure would bring him fame and fortune.

He picked up the little syringe and crossed to the quiet form on the couch. Blinkman had no clear idea of the quantity that should be injected to produce a quarter of a century of suspended animation, and he was too agitated to figure it out, but when he folded back the professor's sleeve and made half a dozen punctures, he felt dissatisfied. Perhaps it would only last four or five years and the professor would wake up and be furious—for every little scar would be a witness against him.

He had already gone too far now to draw back, so he determined to make sure and use all of the stuff in the vial.

He filled and refilled the syringe, jabbing wildly at the professor's arms and legs until the last drop was gone.

Then with a sigh he sank down in the big velvet chair and stared dumbly at the seemingly dead body before him.

Was he dead? Perhaps he had been from the first. His muscles were so rigid, his flesh so clammily cold, already the violet shadows of dissolution lay beneath his closed eyes. The doctor shuddered and reached for a bracer of brandy.

A bell jangled sharply in the silence. He staggered to his feet and passed into the hall, throwing a fearful glance over his shoulder as he went; it was hard to believe it was not a dead man stretched out on the davenport.

He flung open the door and admitted the professor's attorney, Mr. Lecky, who was to accompany the body to the mausoleum and see it properly installed within.

"Is everything ready?" he inquired brusquely after a cold nod to Dr. Blinkman. He was a man of stern common sense and had opposed as strongly as he dared the experiment which he frankly characterized as "a crack-brained freak."

"I have been awaiting your arrival for almost an hour," returned the doctor smoothly as he led the way to the library, "the serum has acted beautifully, and Professor Hick's discovery is a monumental success."

Mr. Lecky gazed down at the recumbent form with a look of profound disgust, yielding to pity:

"Are you sure he is not dead?" he asked sharply.

Dr. Blinkman turned his head away under pretense of closing the black box. He could not meet those searching eyes. A sense of guilt overwhelmed him, but he managed to retain his cool professional manner.

"Our distinguished friend," he replied suavely, "has already no doubt fully explained to you the effects of the serum upon the living body. It is suspended animation, my dear Mr. Lecky, suspended animation, that is all. He can neither hear, feel, think, taste, move nor speak; at the present moment all the organs have suspended their functions; he is insensible to heat or cold, hunger or thirst. His system needs no fuel because there is no waste, but he is not dead. But had we not better be on the way? We have a long, cold ride before us."

He took from a chair where they had been laid in readiness by the professor himself a long black cloak and soft felt hat of the same somber hue. The helpless scientist was closely enveloped in the folds of the cloak, the soft hat was pulled well down over his head so that his rigid white face was concealed under the broad brim, and the two men supported him between them to the limousine so cleverly that to the waiting chauffeur his master appeared in the dim light to be walking in his usual fashion between his friends.

He was lifted into the car and placed in an upright position on the rear seat. The doctor and the lawyer placed themselves with their backs to the driver, and the limousine rolled smoothly and almost noiselessly out of the stone gateway and turned northward in the deserted road.

Never did either of those two men forget that night ride. The full moon was veiled with thin clouds and a light snow had fallen earlier in the evening. From its purity the black ruts in the road stood out in bold relief. No living thing was abroad, not even a dog barked, and all the houses were dark. The wayside bushes powdered with snow rushed to meet them like sheeted ghosts in the headlight of the car, sped by them, and vanished in the gloom.

Professor Hicks had built his mausoleum of sleep on the top of a hill in a grove of cedars. Thick woods and rocky pastures sloped steeply down from it on all sides, and an abandoned cemetery at the bottom completed the profound desolation of the spot.

At the foot of the hill the car stopped, the two men got out and carefully lifted the stiff form to the ground, still supporting it between them.

THAT morning the professor had summoned his chauffeur to him in the library, and had said: "Stewart, I am going to Europe for a year. Dr. Blinkman will reside here during my absence, and will take charge of everything. You are to take your orders from him, but look to Mr. Lecky for your wages. Bring the car round to the side door tonight at midnight, as I am going to the house of a friend up in the country who will entrust me with a rare and delicate culture to deliver for him at a laboratory in Paris. I will, therefore, go directly from his house to the steamer tomorrow, so you will return without me. Dr. Blinkman and Mr. Lecky will accompany me tonight, however, and you will bring them back here. I am explaining these matters to you so that you will understand why I do not return with them.

"I will say goodby to you now, Stewart, as I will have other things to occupy me tonight."

Thus had the professor paved the way for the midnight journey to the mausoleum, and nipped in the bud any suspicion of foul play that might have been born of the peculiar circumstances under which he was to disappear.

"Wait here," said Dr. Blinkman to the chauffeur, "there is no road up to the house on this side, only a short cut through the woods. We will be back in half an hour."

While in sight of the furred figure on the front seat of the limousine, the men went slowly with the professor slightly in advance propelled by their hands on his shoulders. The chauffeur paused in the act of lighting a cigarette to watch the three dark figures:

"Now I wonder what the legal guy has to do with this trip? Gee! doctors are all nuts."

Once behind the shelter of the thick bushes and low-hanging branches, the two men picked up the professor by the head and feet and carried him swiftly up the hillside.

It was a stiff climb to the mausoleum, and they laid their burden down on the marble steps and stood gasping for breath, and wiping the sweat from their flushed faces, though the night was cold.

Neither spoke, an invisible finger of silence seemed laid upon their lips. The mausoleum was a magnificent structure, perfectly round in shape with a row of fluted pillars supporting the overhanging roof. It was encircled by a flight of shallow marble steps, and bronze bas-reliefs, typifying the immortality of the soul, formed eight panels set deeply in the walls. The domed roof was flattened at the top to receive a thick glass skylight which was protected by an iron grill-work set in a leaden frame. The bronze door swung outward, and was supplemented by an inner door of iron studded with brass nails. Ventilation was supplied by slits in the walls close to the roof, and cunningly concealed in the pattern of the ornate frieze.

As the doors creaked open, Dr. Blinkman involuntarily shrank back from the pitch-black interior, but

Lecky, more self-possessed or perhaps less imaginative, stepped into the inky chamber and felt along the wall until he found the electric light button. Instantly a flood of soft radiance poured down upon the place and streamed out across the marble steps on the dark form huddled there.

The floor was paved with blocks of black and white marble. In the center stood a bronze sarcophagus lined with softly padded white velvet. The sarcophagus was of unusual size; at the head was a pillow of white velvet for the professor's head to rest upon, and at the foot an air-tight metal box containing food-tabloids and a bottle of champagne.

A bronze canopy supported on iron rods sheltered the sarcophagus and completely concealed the open interior from any inquisitive person who might climb to the roof and look down through the skylight. Heavy metallic fringes depended from this canopy all around.

Gently, almost reverently the two men laid Professor Hicks in his gruesome bed, arranged the velvet pillow beneath his head, straightened his white robe and threw the black cloak across the foot of the sarcophagus like a pall. A duplicate key was left by his side in case the effects of the serum should wear off sooner than expected.

The light was then turned off and the doctor and lawyer stepped out side by side into the chill March morning, closing and locking the heavy doors behind them. The cold light of a struggling moonbeam pierced the clouds and fell across the marble steps as they turned once to look back; all else was in blackest shadow.

One Year Later

A YEAR had passed since the March night when Professor Hicks had been secretly laid away in the marble mausoleum on the lonely hilltop. Dr. Blinkman again sat in the library awaiting the arrival of Mr. Lecky and the representatives of the press.

With him was Professor Perkins, alert, keen-eyed, bubbling over with scepticism. "Mark my words," he cried, "you will find that I am right, and our learned friend has been another martyr to the great cause of science. Dear me! where do the others stay? It is time we were off."

"I sent the car to the 8:15 to meet Mr. Lecky," replied the doctor," and the correspondents will also come up by that train. They should all be here together in a few minutes now."

Dr. Blinkman had improved with a year of easy living. His form had taken on flesh, his face a ruddy color, and his manner the pomposity of one accustomed to command. He had no fear of the result of the night's trip to the mausoleum; he felt sure that Hicks was dead months ago of too much serum. He had tried heavy doses repeatedly on animals in the interim, and while they had lain without any signs of decay for a week or month, according to the dose, at the end of that time all had given indisputable evidence that they were dead. He had even kept several until the odor became unbearable, desiring to convince himself beyond all doubt that the serum was fatal in large doses.

All his experiments had set his mind at rest. Tomorrow everything would be his, he thought exultantly as the blare of a motor-horn announced Mr. Lecky's arrival.

The lawyer was soon followed by a hired touring-car containing the special correspondents who had been invited to the "resurrection."

After some light refreshments and a hasty explanation from Mr. Lecky regarding the nature of the professor's experiment, the entire party was on the road to the mausoleum within the hour.

The night was clear and cold, the sky studded with millions of stars and the earth blanketed with a heavy fall of snow. Stewart, hunched down in the front of the limousine with his gloved hands on the wheel and the speed limit off, was turning matters over in his mind:

"Darn funny," he was thinking, "this trip out in the woods again same time as last year, with all these strange guys along too. Something I don't understand. These professors are all crazy anyhow, but Hicks was a good old scout. Wish he'd come back and give this Blinkman bozo the air."

Thus ruminating, he arrived at the foot of the hill with the hired car close behind, and the whole party piled out in the snow, and started to climb the narrow path Indian file, leaving the chauffeurs to gossip and smoke.

Not a footprint of man or beast had broken the smooth snow on the circular steps. The strange edifice rose glimmering from the snows that banked it and hooded it, white, cold, silent, a fit waiting-room on the mysterious route to eternity. Ice had filled the lock of the bronze outer door and had to be thawed out with matches before the key could be inserted. A reporter who carried an electric flash-light threw the beam on the lock and the rest stood grouped at the bottom of the steps, all eyes and ears and shivering with cold and expectancy. By tacit consent, as the great door swung slowly outward, Dr. Blinkman, Professor Perkins, and the newspaper men dropped back to let Mr. Lecky enter first. As on his first visit the preceding year he pressed the button in the wall and the electric light streamed down upon the interior from the rows of bulbs around the skylight.

Everything was exactly as it was left twelve months before.

One by one the awe-stricken men stepped softly in and gathered round the sarcophagus, staring down wide-eyed upon the white face of Professor Hicks. No change had taken place in those frozen features; there were no indications of decay and neither were there any signs of life. To all appearances he was still a dead man—and the hands of Mr. Lecky's watch pointed to ten minutes after midnight.

The professor was overdue on his journey back from oblivion.

No one moved, no one spoke, every eye was riveted unwinkingly upon the rigid form stretched out under the bronze canopy, every heart beat madly with suspense, and teeth chattered like castanets with excitement and the deadly cold of the tomb.

"One o'clock," said Professor Perkins at last as he pocketed his watch. "Supposing Professor Hicks' theory of his serum to have been correct, perhaps it would be as well to assist returning circulation by rubbing the extremities. Let us remove him from his present resting-place to the floor."

So the poor professor who had sacrificed himself on the altar of science was tenderly lifted from his huge bronze coffin, and for more than an hour the men took turns at rubbing his icy hands and feet, and working

his stiff arms up and down like pump-handles; at the end of that time, and after every test known to medical science had been applied, Professor Perkins sadly pronounced him to be dead.

He was restored to the sarcophagus, the long black cloak was again thrown over him, this time to conceal his face, and Mr. Lecky, turning to the horrified group, spoke briefly and solemnly:

"I have already explained to you, gentlemen of the press, the fact that we are obeying the instructions of the late Professor Hicks in gathering here tonight. He made an heroic experiment in the interest of science and it has failed. On my return to my office tomorrow, I will hand you the explanation of this most lamentable affair as prepared by him to be given to the world in the event of just what has happened—his death. In view of the peculiar circumstances surrounding his demise, I think you will all agree with me that a second burial would be a mockery, and that we cannot do better than to leave him here to the long sleep, from which we are now convinced he will never wake in the flesh."

Slowly, solemnly, the silent company passed out, the great door clanged shut for the last time, and the mausoleum's quiet occupant was left to await the resurrection dawn.

The Awakening

IN the dew of the early morning a young woman alighted in the cedar grove surrounding the ruined mausoleum where Professor James Holloway Hicks had lain for two hundred years. Her bare white feet were thrust into sandals of snowy leather, her superb form was clothed only in a scant garment of thin white silk that only reached to her dimpled knees and left her arms and shoulders uncovered. Her glorious golden hair was confined by a fillet of silver studded with turquoises, and anklets and armlets of the same jeweled metal tinkled and clinked musically as she walked or rather glided forward.

Suspended from a thick gold chain about her neck dangled a cylinder about two inches long and of a dull green substance. From her shoulder-blades extended broad wings of a glittering, semi-transparent, membraneous material, and these beautiful wings she folded as her feet touched the ground—apparently without volition just as a bird folds its pinions when it alights, but really by touching a small protuberance set in a belt of white leather that crossed her full bosom.

She looked around her, and her eyes caught the gleam of marble through the trees. Stooping, she touched the backs of her sandals and immediately a pair of little wheels sprang out under the soles; on these she rolled smoothly and rapidly toward the crumbling tomb. Rain had stained its purity, sun and wind had cracked and crumbled the cement that held the marble blocks together; many of the columns had fallen and were buried in weeds and débris, and the walls were half submerged in a rising tide of soil, only the upper half of the bronze door remaining above the ground.

"It is a temple of the dead," she exclaimed delightedly, "and none are supposed to be in existence now. Oh, what a find! Grandfather must come here tomorrow and explore it. He may find some priceless relic of the old, old barbaric times, or new material for his film on 'Ancient Customs of a Wingless World.'"

Her curiosity was aroused and she circled the ruined mausoleum slowly on her wheeled sandals, looking for a crack or a peep-hole in the walls, but solid marble confronted her. Determined to find some fissure through which she could see the interior, she spread her majestic white wings and rose above the roof, where she hung poised in the sunlight, gazing down upon the fragments of the iron grill-work still adhering to the leaden frame. The sheet of glass beneath it had long ago dropped and been shattered on the bronze canopy below.

The winged woman had a good view of the inside of the mausoleum through the broken skylight, and she studied the bronze canopy-top with increasing interest, trying to conjecture what it could conceal.

Resolving to find out and reap the glory of a first discovery, she alighted on the roof and removed the fragments of iron still projecting around the edges of the opening. The air that arose from within was cool and sweet. She measured with her eye the distance from the roof to the flat top of the canopy beneath. She could not make use of her wings in squeezing through the narrow skylight, and the canopy appeared to be as solid as the marble walls. Seizing the sides of the aperture, she fearlessly lowered herself through it until she hung by her hands, then let herself drop.

When 150 pounds of solid, healthy womanhood struck the top of the canopy exactly in the middle, the metallic supports snapped like so many pipe-stems and the whole structure heeled over like a full-rigged ship in a squall, and spilled her on the floor, where she sat half stunned by the fall and afraid to move.

The floor was deep with fine gray dust mingled with shreds of black near the great sarcophagus. The canopy had toppled to one side clear of the bronze coffin, which now stood fully revealed. All around her on the floor were little reddish heaps of rust like gouts of dry blood where the metallic fringes had fallen. She had discovered the sarcophagus had no lid and was so frightened at the thought of the horrible unknown dead thing within it, that she was about to unfold her wings and try to scramble out through the roof again when a sound broke the profound stillness and robbed her of strength to stir.

It was a long, fluttering sigh.

She closed her eyes in helpless terror.

When after at least ten minutes of absolute silence she ventured to open them again, a large white hand was dangling over the side of the sarcophagus.

She sat staring at it, mute, paralyzed, waiting for the dead to rise and destroy her for having dared to invade the sanctity of the tomb. Then a dark head appeared and a pair of broad shoulders, and a man sat up and looked stupidly around him.

His eyes wandered slowly round the bare, windowless walls, and rested on the beautiful intruder. He spoke in a thick, hoarse whisper, articulating the words with difficulty like a child first learning to talk:

"Who are you?"

Though trembling with fear, she understood him at once and answered timidly but clearly:

"I am Rosaria. Please don't hurt me."

The man continued to gaze at her for some time in silence, evidently pondering deeply over some problem he could not grasp, but when she made a motion to rise, he spoke again, hurriedly but in a clearer voice than at first:

"Don't, I beg of you. Remain where you are, my dear young lady, I am—er—not—er exactly presentable."

SOMEHOW his tones sounded more natural now, and she sank back to her sitting posture on the dusty floor obediently, but wondering, fearful that this "dead" man was half bones and so objected to being seen in a skeleton state. She was too amazed at this weird tête-á-tête to be frightened now.

The truth was that a quick downward glance had revealed to the professor the scandalous fact that he was clothed only in a layer of dust and a few tattered shreds of his silk undergarments. It was a most embarrassing situation to say the least, but probably it did more to shock his dormant senses into their normal activity than anything else could have done.

Professor Hicks was a very modest man.

The fair Rosaria was next to break the silence:

"You are dead, are you not?" she asked gravely. "But I never knew that the dead could speak. This must be why we disperse them, so they cannot talk to us and bother us about their affairs."

"Dead!" cried the professor, his voice still a trifle husky, but growing stronger every minute as the returning flood of life swept through his veins. "I am not dead, I'm very much alive. I have not the faintest idea who you are or why you are here, but, no doubt, you can tell me why Dr. Blinkman and Mr. Lecky are not here at my awakening. Perhaps I have recovered consciousness too soon—or have I been longer than I expected to be? My robe must have been destroyed by moths—something I should certainly have guarded against."

The winged woman heard him through attentively, and at once grasped his meaning. "I do not know your friends," she declared, "but evidently you have overslept yourself. Why did you come to a place like this to sleep, an old-time temple of the dead, probably the only one left on earth; our dead have been dispersed now for many generations."

Professor Hicks gasped, and in his agitation almost forgot his nudity and came near to leaping out of the sarcophagus.

"Generations!" he almost shrieked. "Good Heavens, girl! how long have I been here? What year is this?"

"This," said Rosaria, "is the 10th of June 3014."

For five minutes the professor remained actually dumb with amazement. Then his voice rang out in a hoarse cry of mingled astonishment and triumph:

"The serum! the serum! it is more powerful than I thought. I can bridge the centuries for the human race. I can make man almost immortal. Animation has been suspended in me for two hundred years."

He suddenly realized that he was hungry: two hundred years is a pretty long time between meals for a full-grown man. He felt for the metal box of tabloids that had been placed at his feet. The hinges were gone from the lid, which had fallen off, and the tabloids were merely pinches of powder. He picked up the bottle of champagne, struck off the neck on the side of the sarcophagus, and drank thirstily. The wine was flat and sour, but it moistened his dry throat and parched tongue most acceptably.

Something heavy and cold fell against his naked side; it was the key to the door of the mausoleum.

"Now my dear Miss Rosaria," he said, "I am placed in a very peculiar position, which I will be able to explain to your entire satisfaction when I am a little stronger. Can you not procure me some clothes and something to eat so that I can leave this terrible place? Here is the key to the door."

He lifted the great key and threw it at her feet.

But Rosaria shook her head:

"The key is no use," she said, "the door is half underground now. You can escape the way that I entered, through that hole in the roof."

He glanced round at the walls which had enclosed him for two long centuries and shuddered:

"I cannot possibly go out in this condition, I must have something to wear, and I am terribly impatient to breathe the free air and walk on good old terra firma again."

Rosaria sprang to her feet:

"I will go at once," she cried, "do you wait here until my return. I will fly back within the hour."

As she stood up, she unfolded her white, glistening wings in such a way as to form a screen between herself and the shrinking man who was vainly trying to hide himself in the bottom of the bronze box. To the professor's amazement, she floated up to the roof like a bird or a gigantic butterfly. Seizing the edge of the opening in her strong white hands, she deftly furled her wings while Hicks stared, open-mouthed, and raising herself through the aperture, spread them quickly again and soared up, up against the blue sky, until he could see her no longer.

"The human race has developed wings like the angels since I retired from the world," mused the professor. "Many marvelous things must have happened while I slept."

He fairly trembled in his eagerness to leave the mausoleum and see for himself the progress the world had made.

He rose, stretched himself, clambered over the side of the sarcophagus and stood with his bare feet in the dust of centuries. He walked over and pressed the electric light button near the door; the button fell off in his hand. He gazed overhead at the patch of blue sky and saw what he took to be a large bird pass swiftly across it; later he learned it was a man flying.

Soon after he heard something on the roof and darted behind the fallen canopy, which afforded an excellent screen. Rosaria appeared at the opening and dropped a bundle through it. The professor crawled out from behind the canopy, grabbed it and scurried back to shelter. The bundle contained a garment of purple silk reaching to his ankles, a pair of white leather sandals with what looked like flat buttons at the heels and little folded fans under the soles, and two long ribbed contrivances attached to broad pieces of leather.

He could not imagine what they were intended for, and after pushing and pulling them, trying to shut them up and spread them open, he finally threw them aside in disgust and attired himself in the robe and sandals.

When he was dressed he shouted boldly: "Miss Rosaria! Miss Rosaria!"

There was a swish overhead and the winged woman knelt at the opening and looked in.

"I dropped on that broken thing over there when I came in. You see there is no room for me to use my wings, the aperture is too small. I could use them going out because I could catch hold of the edge with one hand and fold them up with the other before I climbed through. But I can't, coming down. I'll have to hold on by both hands and drop. It is too far to the floor, so you must stand up in the box and catch me. Only be careful not to break my wings."

Wonderingly, the professor climbed back in his bronze coffin again, stood up to his full height and stretched out

his arms. Fortunately, the roof was not very high and he could reach her ankles with his hands. So she rested her pretty sandaled feet on his palms to steady herself before she let go. The professor made a valiant effort to catch her, but staggered under her weight and both fell in the bottom of the sarcophagus. With that white and gold bundle of womanhood in his arms, the professor suddenly felt how silly all his crucibles and retorts and serums had been. He could not even remember the formula of the serum of suspended animation, and he didn't care if he never remembered it now; it had served its glorious purpose, it had bridged the centuries between him and this super-girl, who was winged like an angel, and he felt that he was through with all that had been so important to him two hundred years ago.

For the first time in his two hundred and thirty-five years, the professor was in love.

Laughing, but not in the least embarrassed, the remarkable Rosaria disentangled herself from the professor's arms and sprang lightly out upon the floor.

"Oh!" she exclaimed, "where are your wings? Why didn't you put them on?"

"My wings?" said the bewildered professor feebly, "I have no wings, my dear Miss Rosaria. Nobody had wings in my time."

"No," she said calmly, "I don't suppose they were invented then. Eat your lunch and afterwards I will help you put them on."

From a silver box delicately enameled in colors hanging from her wrist by a slender chain, she produced a number of small vials bearing tiny labels, and filled with differently colored liquids.

Rosaria enumerated the various edibles as she handed him these vials:

"Roast beef, wheat, chicken salad, cheese, potatoes, oranges, coffee and wine. These," she explained, "are extracts of the essences of the foods and drinks I have just named. By reducing them to the actual concentrated essences necessary to nourish the human system, we avoid taking waste matter into our stomachs. We have thus eliminated a great deal of unnecessary work and solved the servant trouble and expense that used to be such a great source of annoyance to our grandmothers. The kitchen range and sink have disappeared with the butler's pantry and the storeroom. There are no meat-markets, no grocery-stores, no dairies; everything we eat and drink is prepared by the government laboratories and sold in drug stores. A year's supply of food for a family of eight persons may be kept in a small cellarette."

By this time the professor had swallowed his lunch. While he felt sustained and wonderfully strengthened by the essences, at the same time it seemed too much like taking medicines to be enjoyable.

ROSARIA now assisted the professor to strap on his wings with the broad leather belt, explaining as she did so, that they were controlled by a tiny spring on the breast which turned on or off at will the electrical current drawn from the body of the wearer, which also controlled the action of the wings. It was all so beautifully simple, the professor wondered why nobody had thought of it before the clumsy airplane of his time was invented. With a little practice and the help of his charming companion he was soon able to balance himself quite well in the air, though he could only rise a foot or so above the floor in the restricted space of the tomb. But when he attempted to catch the edge of the skylight opening and climb out, one of his wings collided violently with the roof because he forgot to touch the spring, and snap went a rib.

Poor Professor Hicks tumbled to the floor and pretty Rosaria wrung her hands in dismay.

"It is too bad," she cried. "It would have been so easy to go out that way. Now I will have to use my radiomatic and partly destroy your lovely temple."

She touched the small, dull-green cylinder that hung from her neck:

"All women carry them," she said, "for since everybody flies who can afford to buy, borrow, rent or steal a pair of wings, it is not safe for any woman to fly out alone without being able to protect herself. I hate to spoil your temple though."

"It is not a temple," exclaimed the professor hastily, "it is just a tomb, a place to put the dead in away from sight. There were much finer ones than this. Don't you be afraid to wreck it, I—I hate it!" he jerked out disgustedly.

"Why," she asked suddenly, "did they keep you? Why didn't they disperse you? Or did you die long before our method of dissolving the dead into nothingness was adopted?"

"People were either entombed in the earth or in a crypt or mausoleum like this in my time, or were cremated," he replied. "I never heard of any other way of disposing of the deceased—unless with quicklime, which was only used on the bodies of criminals."

"Oh!" said Rosaria, "how funny! It must have been dreadfully unhealthy to have a lot of dead people lying around."

"What do you do with them now?" inquired the professor.

"We disperse the remains," she answered. "The coroner turns a powerful X-ray upon a body and it vanishes, resolves into nothingness. It is so much cleaner—and cheaper."

"Can you use that little gun of yours on the locks of these doors?" asked the professor, impatient to get out. Just then the marvelous X-ray did not interest nearly as much as the thought of freedom. The very idea of having spent two hundred years in the limited space of the marble chamber almost stifled him. He wanted to feel the cool winds of heaven on his brow, hear the songs of the birds, touch the green leaves once more. The serum did not interest him, now that he could look at Rosaria's exquisite profile.

"You can't get out of that door," said his fair deliverer. "It is closed and the earth is banked against it half way to the top. I will make an opening above the level of the ground as nearly as I can judge."

She lifted the little cylinder and pointed it straight at the marble wall.

Professor Hicks heard no report, saw no flash, but almost immediately a tiny bubble was traveling rapidly up the smooth surface, and as it moved, the marble melted beneath it until a fissure an inch wide appeared.

Rosaria still stood with the little cylinder extended as if taking aim. The bubble on the wall vanished when it had covered a foot and another bubble took its place, traveled the same distance and a third bubble continued the crack. This was succeeded by a fourth and a fifth until three sides of a square was formed. The direction taken by the bubbles was determined by the position from which they were aimed. With the sixth bubble the section of the wall tumbled inward, raising a great cloud

of dust as it fell. Blue sky, green trees, and sunlit turf appeared through the opening, which was breast-high.

"The radiomatic fires a bubble of radium gas," explained Rosaria, "and nothing can withstand it, neither stone nor steel, nor iron nor living flesh."

"I feel," said the professor irrelevantly as he gazed out into the world again, "like a ghost. I am two hundred and thirty-five years old and I feel like an infant in knowledge beside you."

Rosaria opened her violet eyes wide, and shook her shining head gravely.

"I am not wise," she said earnestly, "I only know the common things I see, but the world is full of very wise people—those who know how to harness the winds and direct the stars, and make the sun obey. Disease is unknown and death rarely occurs, unless in accident or battle, until the mind becomes so weakened that it can no longer command the forces of the body."

"I suppose earth has changed greatly since my time," he sighed, "and all the governments of the various countries have also changed."

"There is only one government now over the entire world," said the winged girl. "In the summer of 1930 a projectile was fired from the earth to the moon, and it was successful in reaching it. It was then for the first time that the moon-people were sure that the earth was inhabited and therefore habitable. So they came to earth in a great cylindrical car—at least some of them did, and finding earth so very far behind moon-times, and also that very large areas on its surface were unpopulated, the moon-people remained here, and sent for many more. Being so much wiser and so much farther advanced in civilization than the earth-people, they became rulers here, and by intermarriage soon improved the earth-races—mentally, morally and physically."

THE professor pondered over this astounding information a few minutes before he asked another question:

"Are you still able to travel from the earth to the moon and *vice versa?*"

"Oh, yes," answered Rosaria, "almost everybody who is anybody at all takes a trip to the moon once or twice a year, and the moon-people are frequent visitors here. This is also true of the nearer stars, but we have not yet found a way to withstand the long period of traveling in the intense cold in order to reach Jupiter."

"But you still speak the same language—the good, plain English that was spoken over half the globe when I withdrew from active life to my long rest."

"That," said Rosaria, "is because English is so much more expressive and contains so many more words than the language of the moon-people, which is only founded on half the letters of the alphabet, and moreover is very difficult to pronounce properly, being a series of gutturals from the throat rather than the tongue."

"And animals?" queried the interested professor.

"There are very few, only the cow, the hog, the hen and the dog have been allowed to survive, the three former because they are useful for food and fat, the latter for friendly companionship and protection while we sleep. The weavers make furs from silk and wool far more beautiful and durable than the finest pelts. Silk, too, is manufactured from vegetable matter, independent of the silkworm, which is now seen only in museums. So it is with ivory, leather, and gems; science has found out the secrets of nature and makes them far better and at less cost. But had we not better climb out of here while it is yet light?"

The professor gallantly knelt for Rosaria to mount upon his shoulders and she wriggled through the narrow opening without injury to her precious wings. Professor Hicks then scrambled out, aided by the lady's strong little hands. He stood looking round him at the green woods, the glimpse of the Hudson, but a few miles distant, and the azure heavens through which sped occasional specks he knew were men and women. But he looked longest at the ancient mausoleum which was yet younger than himself, and like himself had withstood the assaults of two hundred years. Then he turned and gazed spellbound at his lovely companion. He felt that the wonderful serum had fulfilled its mission, and that there was no need of it in this marvelous new world into which he had returned. Then and there he ceased to be the professor; he became simply James Holloway Hicks.

"And you?" he asked, "are you an earthwoman?"

"Not altogether," said the winged girl, "I was born of an earth-father and a moon-mother."

Strange flutterings assailed the heart of James Hicks, hitherto callous to female charms, and then happened the most surprising event of that surprising day.

He dropped gracefully on one knee at the feet of his enchanting rescuer and lifted her dainty hand to his lips:

"Miss Rosaria, are you married? If not, will you fly through life with me?"

* * *

THE morning sun was streaming through the long windows of his study. Outside every branch and twig and bush was sheathed in ice and flashing like a million jewels. The professor turned his head and saw Dr. Blinkman smiling at him from the depths of an easy chair:

"I thought it wouldn't work on you," he said, "but you have had a good night's sleep, and at times you seemed to be dreaming."

THE END.

The Secret Kingdom

By Allen S. and Otis Adelbert Kline

(*Continued from page 745*)

Nona and the sovereign accompanied Tupac to his house. The special Curaca guardsman was sent for at once, but a servant returned with the report that Ripac was nowhere to be found.

"Very well," said the Villac Vmu, "we will look for the white Curaca ourselves; for if the servants cannot do as they are bidden, then must the master serve himself."

He went about unlocking the various cells, and then the dungeons, his expression of injured innocence deepening with each new failure to locate the man whom they sought.

"Summon your slaves," said the Inca finally. "We will examine them separately."

The wretched vassals were overawed by the presence of the great monarch, but they also feared the wrath of the High Priest. Hence, more than fifty had knelt in succession at the feet of Huayna Capac, and asserted that they had seen nothing of the white man, before anyone was found who would give even a fragment of information.

The man who broke down under the questioning of the Inca was a newly acquired slave in the household of Tupac, and therefore not thoroughly versed in the ways of his wily master. He stammered that he had seen Ripac lock the white Curaca in the den of the boa constrictor.

The Villac Vmu was outwardly calm, but inwardly he was boiling.

"Are you positive that what you say is true, O scum of the earth?" he asked.

The frightened slave answered in the affirmative.

"This is indeed serious," said Tupac. "I do not believe that Ripac could have done such a thing—but we will investigate."

He led the way to the den of the boa, unlocked the door and slid it open a little way. A gruesome sight met the eyes of those who looked within.

The huge reptile was sleeping peacefully in the center of the floor. Near the middle, its body was distended to twice the natural diameter for a distance of more than five feet. It had unquestionably swallowed either a man or something the size and shape of a man.

Nona uttered a little choking cry and swooned. The Inca himself caught her in his arms and called for restoratives. When she recovered consciousness, Huayna Capac and the High Priest were conversing.

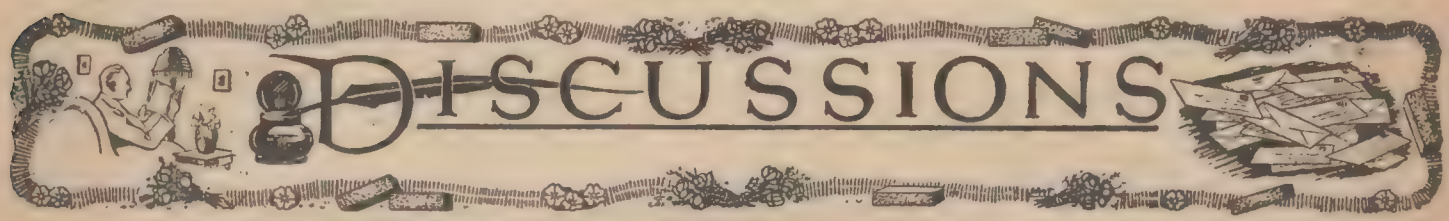
"I cannot understand why your men should have committed such a terrible act without an order from you."

"Nor can I, Your Majesty. I think it probable that Ripac thrust the white Curaca into this room by mistake, believing it to be one of the regular cells. No doubt he discovered the awful consequences of his error, too late to rectify it, and has fled in fear of my wrath. He shall be hunted down and punished for this. I promise Your Majesty that he shall suffer for his carelessness."

"Punishment of the culprit. . . will not bring the dead man back. . . from that horrible living tomb," sobbed Nona.

"It seems that our search has come to an end," said the Inca. "Let us return to the palace."

END OF PART II



In this department we shall discuss, every month, topics of interest to readers. The editors invite correspondence on all subjects directly or indirectly related to the stories appearing in this magazine. In case a special personal answer is required, a nominal fee of 25c to cover time and postage is required.

A CONFIRMED SKEPTIC IN HIGH SCHOOL; HIS MISCONCEPTION OF THE ACTION OF A ROCKET

Editor, AMAZING STORIES:

I might start this letter by saying that I am a high school student and a confirmed skeptic of anything which seems to me unreasonable. Yet I do not reject any theory which seems to be plausible. Rather I look for holes in it. I am not a regular reader of your magazine, but when I do read it, I read it thoroughly. I am patient with your authors. I don't kill the enjoyment of a story by assuring myself that each incident that is disclosed is impossible. But I do object to obvious incongruities. In particular, I refer to two obvious mistakes in "The Dimension Segregator." While I enjoyed this story, still I am skeptical. The author refers to an absolutely solid metal, which he claims (through his character in the story) is made by subjecting iron to a temperature of absolute zero. I allow that it might become solid, but I see no reason for it remaining so when the temperature is raised again. Another point which seems to me absurd is the point at which the scientist gayly proceeds to carry his two dimensional pig around by squeezing it between his hands. If the pig would pass through solid metal, I don't see how he could prevent it from passing through a resistance as slight as his hands! Some of your readers might point out that, in the story, the pig had no weight, and hence would not slip. Then how do they account for the professor's hand sliding off into space? It evidently moved by inertia, and, since it had no weight, I don't see how it could move by inertia, or momentum, when it could not have any! I won't continue in this vein any longer, but will raise a loud cry of "down with interplanetary stories and out with the ancient 'Red Peril' theme!" I realize that these subjects are favorites with authors, since they, especially the former one, allow such freedom for the imagination. But I for one am sick of them.

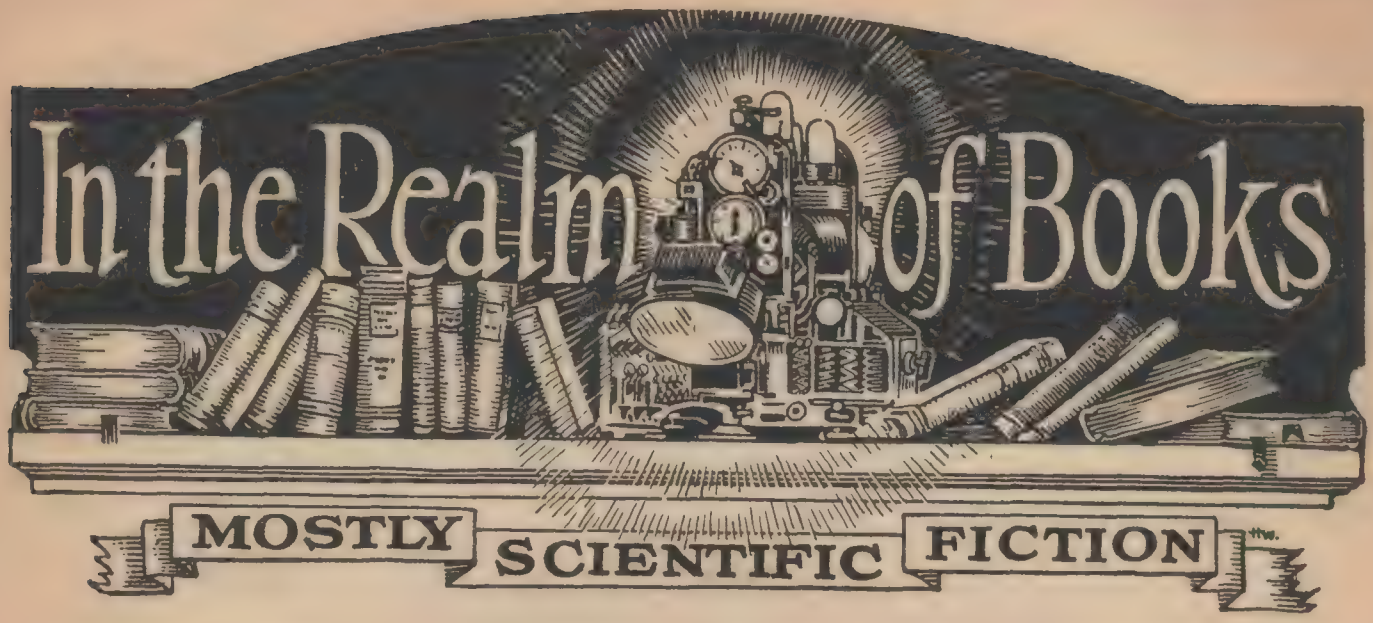
The astonishing long letter in your "Discussions" of the September issue attracted my attention. The writer, as many of your correspondents seem, is all agog about interplanetary transportation. My own opinion of that "rocket car" business is that it is fundamentally unsound. A rocket depends for its motion on the very simple principle of action and reaction. When there is nothing tangible to react on, I claim a rocket must stop. I picture a rocket outside of the earth's atmosphere as a man trying to row a boat with his oars beating the air. Since the oar blades cannot obtain a hold, the boat cannot move. And since, outside the atmosphere, the rocket gases can obtain no hold, the rocket would crash, as one of Dr. Goddard's recently did. In the letter mentioned above, the writer says he fails to see how an explosive can burn without oxygen. I have fooled enough with chemicals to know that there are many explosives which are quite capable of supplying their own oxygen. Did this writer ever hear of a depth bomb, for example? If you *must* continue with your interplanetary stories, I hope some day to see one without a beautiful heroine, without an ambitious villain, and without a war brought on by some nation, and brought to a successful close by the hero.

I realize that this letter is all adverse criticism, I realize that your regular readers will want to tear me apart, if you print it. But let this hold them: I have tried to make no statement I cannot prove, and I have read so many of their letters which to me reveal a multitude of mistakes, that I no longer feel the urge to reply to them! But on the whole, I like your magazine, and wish there were more to it.

T. R. Bartlett,
3111 W. Coulter St., Philadelphia, Pa.

(In your own words your letter "reveals" a bad

(*Continued on page 758*)



A Choice Selection

"Beware after Dark," by T. Everett Harre. *Published by The Macaulay Company,* $2.00.

I FOR one, have no fault to find with this collection of short stories, which, for the most part, properly belong in the "Fantastic Adventure" class. A few might be called occult and bizarre. Notable among the better stories are: Arthur Macken's "Novel of the White Powder," George W. Bayly's "The Sunken Land," Edmond Hamilton's "The Monster-God of Mamwith" and H. P. Lovecraft's "The Call of Ethulhn."

Readers of AMAZING STORIES will be particularly interested in the stories by Hamilton and Lovecraft, whose works occasionally also appear in this magazine.

To me Lovecraft was especially interesting. He seems to me to have the divine gift of "word wizardry" with which he plays on the emotions and paints pictures and impressions of poignant clarity. His "Colour Out of Space," which appeared in the October, 1929, issue of AMAZING STORIES, has always seemed to me to be a marvelous bit of writing.

But even the lesser part of this collection is thoroughly enjoyable. Mr. Harre showed obvious good choice in his selection of these stories, and a great deal of care. They are all worth reading. . .C. A. B.

"Electropolis"

"Electropolis" (*M. German*), by Otfrid von Hanstein. *Published by Levy & Muller,* Stuttgart, Germany. $1.75.

BY this time it is quite safe to say that von Hanstein's pet idea seems to be one of utilization of deserts and tropical territories. This subject forms the basis of his two earlier books: "Emperor of the Sahara Desert" and "The Farm of the Missing Man." His ideas reach the pinnacle in his last book, which he calls "Electropolis"—a city of technical wonders.

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The book is convincingly written, the illustrations are good, and the lover of scientific fiction will find a veritable mine of proven and possible inventions, which will stimulate the imagination and provide good entertainment. . .C. A. B.

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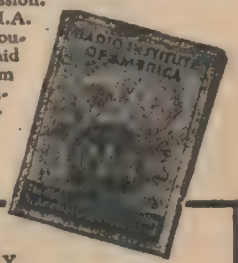

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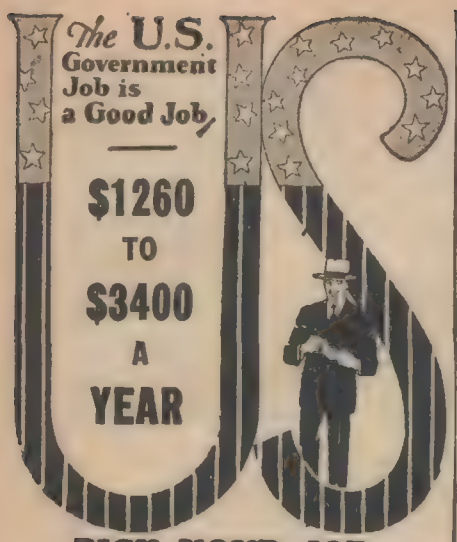

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error in elementary physics. You entirely misunderstand the action of a rocket. Action and reaction are equal and opposite. The action of a rocket is due to the rush of gas from the case or body; the reaction of the gas is against the body of the rocket which drives it on. It really is true that in a vacuum a rocket would go further than it would in the air. The pressure of the gases against the air has nothing to do with the rocket's advance. You entirely misunderstand the action and the corresponding reaction. There is no resemblance between the rowing of a boat and the motion of a rocket. The word burning is used to indicate the combining of a combustible substance with oxygen. The oxygen may surround the object, or it may be mixed with it, or chemically combined with it. In gun powder it is mixed with it by the presence of potassium nitrate; in nitroglycerine it is chemically combined with it. You must remember that there are many explosives which contain no oxygen and in which explosion oxygen takes no part. All we can say about interplanetary stories is that our readers ask for them. And it seems to us, that in spite of inconsistencies, a good many of them necessary to the story, they do include a lot of good science.—EDITOR.)

THE ROCKET IN A VACUUM AGAIN

Editor, AMAZING STORIES:

After reading in many of your stories of space fliers, who depend on rockets as a means of propulsion, I have decided to ask a question. How can a rocket recoil if there is no air or gas to offer resistance to the stream of gas and flame issuing from its mouth? If there is no recoil there is no motion. Using nullification of gravity and attraction of planets is a more possible plan.

Albert L. Mills,
87 Lincoln St., Jersey City, N. J.

(This question you will find answered elsewhere. The presence of air only impedes the flight of a rocket.—EDITOR.)

SCIENCE CORRESPONDENCE CLUB

Editor, AMAZING STORIES:

I have noticed in the columns of your magazine at various times suggestions for a science correspondence club. I am glad to say that one has already been started, bearing that name, as you will notice by the letterhead. There are at present about thirty members in the club, and about a dozen more have signified their intention of joining. Although it has been in existence for several months, it has not become definitely organized until recently. In your reply to the letter of Walter Dennis (who, by the way, has joined our circle) you declared that your help would be given in any way reasonably possible, to make the club that he proposed a success. To the best of my knowledge, this is the only club of its kind in the field, and all concerned are bent on keeping it that way by preserving its unity. I am sure that the promises you have made in the past have not been retracted, and your interest in this venture has not declined. At present a club bulletin is planned, and if you are interested in our progress, I am sure our president will send you a copy. May I ask through your column that those who are interested in joining should writer either to Aubrey Clements, of 6 Hilliard St.,Montgomery, Alabama, or to Raymond A. Palmer, 2226 Vine St., Milwaukee, Wisconsin, for further information?

Dr. Sloane, in his editorial for this month, requested that some reader find the mathematical relation of a cube to a sphere exactly surrounding it. By a little arithmetic and less algebra I arrived at the following result:

Let R = radius of sphere
Let S = side of cube

$$\text{Then } \frac{R^3}{.9549} = \text{Volume of sphere}$$

Then S = Volume of cube
Therefore:

$$.866026\ S = \frac{R}{\frac{R}{.9549}}$$

$$2.720693\ S^3 = \frac{R}{.9549}$$

I guess that's about all the acrobatics this typewriter will stand. A pencil and paper is much better for that purpose. The decimals in the above numbers are abridged, partly to keep them from running off the page, and because they have no end—just like pi.

I have no objections to make to your stories,

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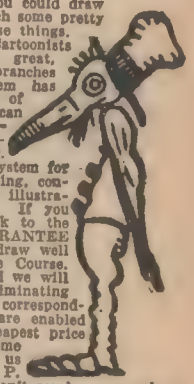

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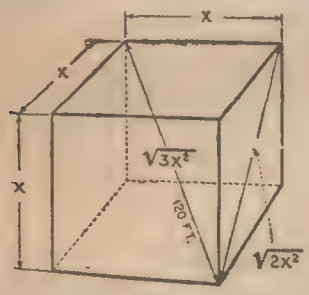
but I am sorry that Mr. Paul is no longer on your staff. Despite what other critics may say, I believe that his drawings are far more realistic than those created by your other artists. I say created, because pictures in your magazine must be drawn from imagination, and I am making allowance for this fact in criticism.

No author seems to be cognizant of the possibility that all life, plants and animals included, may have been developed from a comman ancestral protobion (*proto*, first, *bios*, life) which is, of course, non-existent at present. What leads me to believe this, is the reason for similarity of the lower orders of plants and animals. Coral and sponge colonies are anchored, while some undersea plants have comparatively rapid motion. I would like to have your comment on this.

Leonard May,
17 Delaware Ave., Jersey City, N. J.

(Your solution of the cube and sphere problem is not clearly explained, and you do not tell what the side of the cube is. Of course, by dividing R by .866026 the value of S is given, and this is the answer. If you work by the square of the hypotheneuse you will get the following formula:



The diagonal of the cube will be the diameter of the sphere, which is 120 feet. Working by the square of the hypotheneuse we get for the value of the diagonal of a side of the cube $\sqrt{2X^2}$ and for the diagonal of the cube $\sqrt{3X^2}$. As this diagonal is 120 feet, we have the equation—

$\sqrt{3X^2} = 120$

and solving we find—

$X = 69.3$

We are certainly interested in your club and would like to see your bulletin. Evolution is a very old doctrine and the most recent theories leave it about as much a mystery as ever. Your idea about the protobion is quite interesting and we are glad to give it in our columns.—EDITOR.)

DR. BREUER'S CRITICISMS OF "THE PURPLE DEATH" REPLIED TO BY THE AUTHOR OF THAT STORY

Editor, AMAZING STORIES:

Replying to Dr. Miles J. Breuer's criticism of "The Purple Death" in the "Discussions" column of the September issue of AMAZING STORIES, I wish to thank the Doctor for the facts which he calls to the writer's attention.

The Doctor is quite right when he intimates that the author of this story knows nothing about practical bacteriology, said author never having had the opportunity to acquire such knowledge. However, I do wish to take issue with the Doctor on some of his statements.

I did not, as the Doctor claims, treat appendectomy lightly. In the story, Doctor Grey *dreamed* that he had removed organs—the appendix was used by way of illustration—and performed operations without making any incision. The story expressly states that "he could not remember how, *in his dreams*, he had been able to see the rays inside the body, or how he had *completed the operations after removing the offending organs.*" Surely the Doctor does not mean to insist that a dream should be in accord with established scientific facts, since dreams have been notoriously fantastic from time immemorial.

In referring to surgical amputations, the Doctor leaves the impression that unless an amputation is made with all the precautions that are taken in the best modern hospitals, the patient could save money by calling on the undertaker in the beginning, instead of waiting until the surgeon had made a certainty of his demise. A perusal of the files of almost any railroad claim agent will disclose at least one case where an engineer has unwittingly acted as a surgeon—with a locomotive for a scalpel—and the unwilling victim of the amputation has recovered both his health and a goodly amount of damages. Almost any old time saw-mill man can give instances where men have lost a leg or an arm and survived the accident—and with not even

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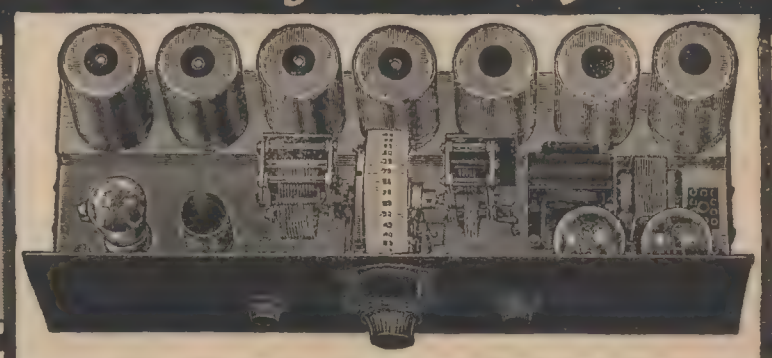

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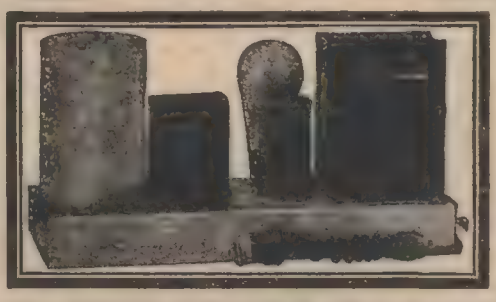

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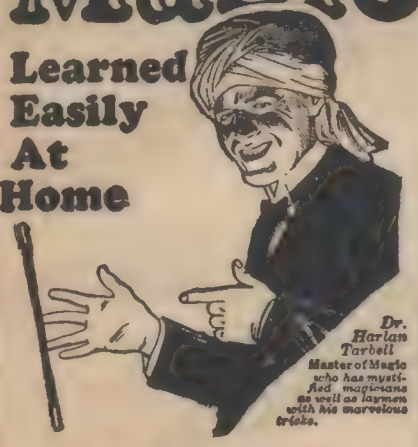

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a tourniquet applied until after the limb was severed.

The writer still believes that it is possible—though not necessarily practical or advisable—to amputate a limb instantly, provided a tourniquet is placed above the point of amputation, the arteries closed with artery forceps immediately after the limb has been removed, and the blood vessels immediately ligated. I have an idea that the rough and ready surgery that is ofttimes practiced in camps and other isolated places, where a doctor and a hospital are not available, is quite often effective though painful and dangerous. In the story, Doctor Grey did not state just how he would go about amputating a limb instantly. He was not talking to another surgeon but to an electrical engineer, who very probably knew little—and cared less—about the surgical possibilities of the Doctor's discovery.

In place of mentioning De Kruiff's *Microbe Hunters* (which, as it happens, contains the facts mentioned in the first three paragraphs of the story), I might have said that Doctor Grey's desk held several volumes of bacteriological reference books, including the *Handbuch der Immunitätsforschung und experimentellen Therapie*, by Kraus and Levaditi, *Die experimentelle Bakteriologie*, etc., by Kolle and Hetsch, as well as other works by Park and Williams, Jordan, Zinser, Kolmer and Hewlett. My reason for not doing so is entirely a personal one. When I read a story and the author refers to a certain book, I usually read the book if it is available in the public library *and providing it is not too technical.* I believe that other readers do the same. While I do not have a speaking (or reading) acquaintance with the above mentioned works, I fear that the butcher, the baker, and—well, the average man with an average education—would find little pleasure in these books, and it is Mr. Average Man who supports magazines, as he forms the large majority of the reading public. I do believe, however, that the average reader might read, understand and enjoy the *Microbe Hunters.* The names of the above mentioned bacteriological reference books might be welcomed by readers of such a magazine as the *Journal of Pathology and Bacteriology*, but not by the casual reader in search of entertainment.

I have only the following comment to make on the criticism on searching for dead microbes in the guinea pig's blood. It is very probable that the statements of one A. van Leeuwenhoek were "mirth provoking" and "ridiculous" to the "practical" scientists of his time. (This is not to be construed as meaning that the writer considers himself a modern Leeuwenhoek.) Another decade or two may find microscopes developed to the point where we may learn that a microbe—like Dean Swift's flea—may have

"—smaller fleas that on him prey;
And these have smaller still to bite 'em
And so proceed—*ad infinitum.*"

I hope to see Doctor Breuer's comments on any future stories that I may be fortunate enough to have published in AMAZING STORIES, but I assure him that I shall in the future avoid subjects that require a knowledge of practical bacteriology.

I shall close with the promise that never shall Doctor Grey or his creator knowingly "monkey" with trypanosomes or spirochetes.

Jack Barnette,
301 B. & O. Building, Baltimore, Md.

(Any comment would spoil this letter, which is as good reading as the story that awakened the criticisms.—EDITOR.)

A SECOND LETTER FROM MR. SCHOEPFLIN

Editor, AMAZING STORIES:

Regarding the editorial reply to my letter as published on page 576, September issue, it seems to me that the real point of the scheme was missed. The electrical method of producing anæsthesia is a purely local one in effect. For instance, in appendectomy only those nerves communicating with the appendix and the surrounding area would be "blocked off" by the counter-current set up in the nerves themselves, thus preventing the pain impulses from reaching and registering in the brain. The patient would be entirely conscious but would feel no pain and there would be no shock following the operation. There is therefore little similarity to the electric chair where high voltage is used to prolong unconsciousness into death. In the electrical anæthesia, the voltage is infinitesimal but the current value high, this having been found characteristic of the normal nerve impulses as determined by the oscillograph. To date, the

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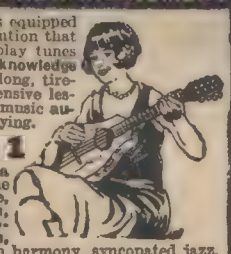

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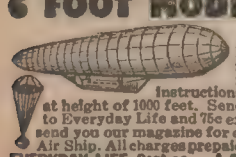

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scheme is in an experimental stage and I understand from one of our research engineers that it has not been put to practical use in operations on human beings as yet, though success has been obtained with dumb animals. However, the electrical nerve impulse characteristic has been definitely proven and that was the point of my original letter.

H. V. Schoepflin,
867 W. 181st St., New York City.

(The editor in his comment on your letter in AMAZING STORIES wished to stress the point that the nervous system of man is not a simple telegraph circuit. The human system is more than a mere mechanism. But how a current of high value is produced with infinitesimal voltage is not clear.—EDITOR.)

CRITICISM FROM PALESTINE

Editor, AMAZING STORIES:

Although this is my first letter to you, I will dispense with the usual apologies and explanations. I shall just note down a few imperfect comments on my impressions of AMAZING STORIES. Without entering into the subleties of the question of criticism, I think that the editor and most of the readers will agree as to the great importance and usefulness of even sharp criticism. Firstly, I strongly dislike your name, and agree heartily with the great number of your readers who request you to change the name. From the first time I read AMAZING STORIES (which is just a few months ago) I have felt that a name something like "Scientifiction" or "Scientifiction Tales" would draw a greater number of readers by not awakening at first sight such unpleasant association as "Amazing Stories" does. In a general way I am afraid that with a few exceptions, the AMAZING STORIES do not possess a very high literary standard. Particularly do I object to the use of slang or argot by many of the staid scientific characters. Real men of science, and especially those of such exceptional merit, which the stories usually depict, seldom use ungrammatical and inelegant language. I think that some of your authors could learn much by taking lessons in style and structure from that great master of Scientifiction, H. G. Wells. Besides, being particularly familiar with his works, I note that he is probably the most original of such writers, most of the ideas of time-traveling, interplanetary flying, extraordinary growth, etc., being due to him. Again I think I may bring an example from Wells in the question of the part love should play in these tales. Wells, who is surely one of the most popular of writers, has hardly ever used the motif of love in his fantastic tales. Of course, I do not mean to convey that love should be entirely eliminated, but I do say that it surely ought to play a more subordinate part than it usually does. Taking up the question of scientific inconsistencies, which is perhaps the most important of all and the main object of this criticism, I notice for instance in your August issue; the idea of long distance hypnotism as practised by Philip Barton is incompatible with the accepted law of psychology—that no person may be hypnotized against his or her will. Again, when the Inquisitor goes up 20 miles, I do not see how and why its height makes it independent of the rotation of the earth. Its initial speed (that of the earth's rotation) is practically the same 20 miles up, as on the surface of the earth. And then again, Philip Barton's method of changing a person's character, lacks, I am afraid, any scientific basis. In "The Dimension Segregator," iron is reduced to absolute zero, which is impossible, at least according to the basic principles of modern science. Then again Tulane's segregation ray consists of a mixture of radium rays and electro-magnetic waves intermediate in frequency between ultra-violet and X-rays, which modify one another's properties in order to form the segregating ray. This is in direct contradiction to Physics, which teaches us that electro-magnetic and other rays do not modify another's properties, but rather act oblivious of each other's presence. It would seem that the author has used a chemical analogy (of the compound in Physics). In "Out of the Void" I cannot exactly understand what the second sun is, but perhaps that was made clear in the second instalment. And then I think our interplanetary hero and heroine might easily have landed on Mars by stopping the powder charges. Then Mars might have called them, as there would be no defying force. Let me now give the ante. Allow me to congratulate you on your experiment and sincerely wish you success. All of your stories are interesting and some of them good. Your discussions are very interesting, and many times are replete

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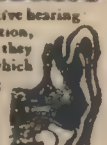

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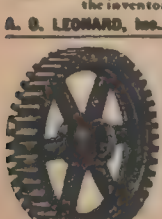

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with conscious and unconscious humor, especially the editorial replies which sometimes seem to evade the questions at issue. I think that Poetry may be reconciled more truly with our strict mistress Science, without license, by the romance of Exactness. I hope from now on to buy steadily all of your Scientifiction Publications, and to criticize as much as possible in the knowledge that the editor receives it in the right spirit, and in the hope of bettering the publications.

M. A.,
Jerusalem, Palestine.

(You say that this is your first letter to us. We shall hope for more. When you read the "Discussions" columns, you will see that many of our readers like the name of the magazine and we feel that to change it for the made-up word "Scientifiction" would be disastrous. AMAZING STORIES is now very well known and it would be a risk from the standpoint of circulation, to make a change.

Hypnosis could not well be used in a story if it was made subject to precise laws, as now understood. It is perfectly fair to have shown that it has developed so that a person can be hypnotized against his will. Besides, there is no rule that says a person cannot be hypnotized if he is using no resistance, because he does not know he is being hypnotized. As a body rises above the earth, its weight becomes less, owing to the reduced gravitational pull exerted by the earth. Therefore its angular velocity would constantly decrease as its radius relative to the centre of the earth becomes greater and greater, so that after a while it will lag behind very rapidly because in order to retain its position in that radius it would have to go faster and faster. At a distance of about 4,000 miles from the earth it would have a velocity of 30 miles per second. This consideration, you see, introduces some very curious and interesting elements into the question. In the Leyden University absolute zero has been almost obtained. Rays produced in the same medium modify each other's properties to the extent of what is called a heterodyning.—EDITOR.)

CRITICISMS AND SUGGESTIONS FROM ONE OF OUR YOUNGER READERS

Editor, AMAZING STORIES:

For a long time I have been trying to get up enough energy to write a letter. Here goes. I won't be too violent in my denunciations; I remember the fellow who wrote a letter to Popular Science. He was very indignant that anybody should be so dumb as to think that a rocket could go through interplanetary space. "Out there there is no air, nothing to push against. A rocket must have something to push against." (Of course the air has nothing to do with the rocket's flight, except to impede it.—Editor's Note.)

First I will criticize stories, then I will criticize the critic who criticized the critic who criticized other critics. (I mean Teddy Projector, who had a letter in your August issue.) Then will come miscellaneous. "Into the Green Prism" was a wonderful story, but there were mistakes in it as John Pinkard showed. I wish you would forget this "poetic license" business. Why not admit the author was wrong and be done with it? Next time he probably won't make that mistake. "Station X" is in my opinion the best story you ever printed. Can I in any way get the magazines it was in? "The Skylark of Space" is second only to "Station X." Peculiar, that the first planet they should land on had X-metal as common as dirt, while the next one was colored green by the enormous quantities of copper it contained. I don't think that the energy taken by the air to expand would have cooled it off enough to freeze it, as it was supposed to have done when some air escaped from the two space cars. And the air could not have *radiated* heat fast enough for that. And we never did find out what that "faidon" was. We want more from those authors. Besides their other attributes, they possess humor, which few authors have. That was an awful mistake in "The Face of Isis" about the projectile going off at a tangent. At that rate it ought to go backwards when it got heavier (heh-heh). How about that sequel to the "Face in the Abyss" that we were PROMISED? Answer me that. Who are you, anyway? Have you separated entirely from the old Experimenter Publishing Company? If you haven't, why don't you advertise that they have come out with two more scientifiction mags.? Can we print criticisms of the stories in those magazines? I am withholding them until you print that information in "Discussions" column.

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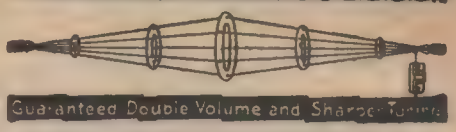

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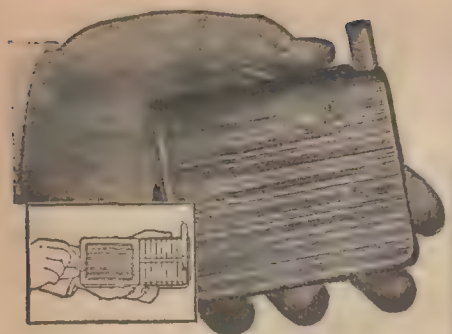

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destroyed, unless at some time we learn to make energy out of matter, or vice versa; and even then we are not changing the sum total. For that reason I cannot believe in perpetual motion. (A machine that gives out more power than it takes in.) It follows that I must discredit there ever being a gravity nullifier, such as was in "Sam Graves' Gravity Nullifier."

Now for the critic *ad infinitum*. I hold that it's perfectly all right to criticize the criticizer, because he sometimes makes mistakes worse than the authors. This same guy that says we shouldn't criticize critics claims that it is impossible to eat or drink upside down. I hung by my knee and drank a whole cupful of water with a straw. Which proves that he is wrong. Oh, yeh, I forgot to say that I am a boy, fifteen years old, a senior, five feet eight in height, dark hair, gray-green eyes. I am interested in any and every science except domestic. I like playing football, swimming, and eating angelfood cake.

Artist Hugh Mackay is good at drawing faces and figures, but he can't hold a candle to Paul for scientific apparatus; but Paul, in turn, is not much good at drawing people. If the two could be combined it would be wonderful. The best picture of humans Paul ever drew was the man and woman in the front of "Ralph 124C 41+." By the way, it seems to me that heat, though not radiated, would still be conducted, the molecules imparting their motion to the ones next them. The man who stuck his finger in his pipe would get burned. Say! we want some more of Baron Münchhausen.

I am going to write a story myself. It will contain three main ideas. The first one is very good, the second one is pretty good, the third one is doubtful. I may not use it at all; probably I'll use a modification of it. But I am certain the first one is good. It is an interplanetary story, and if I decide to use the third idea, it will use a different method of locomotion than has ever been written about before. I hope it (the story) will be what M. Sommer wanted in his letter in the August issue. It will be in length anywhere between "The World of the Giant Ants" and "Barton's Island," though it will probably be much longer than the latter story. By the way, both these stories were very good.

Yours for *more pictures and more pages.*
Homer Amos,
Lynwood, Calif.

(You will find that we have received more letters about rockets in vacuous space. There is quite a prevalent feeling that a rocket has to have air for its gases to push against, which, of course, as you say or intimate, is totally wrong. The author of "Into the Green Prism" is not inclined to admit any mistakes. He is not exactly sensitive on the subject, but he takes the ground that he is right. For back numbers of our magazine containing "Station X," please address "Subscription Department, c/o Amazing Stories, 381 Fourth Avenue, New York." Some of our readers also have old copies which they want to sell, and they will probably write to you when they see this. It would be pretty hard to find just what the fictitious faidon is, as it is a mythical substance. We have been promised a sequel to "The Skylark of Space" in several months. Dr. Smith rightfully, we think, wants to give us the best he can—for which reason we must be glad to wait.

The Experimenter Publishing Company is no longer in existence, and we have no other connection or affiliation with the other magazines you refer to.

We certainly agree with you about gravity's nullification, but you must admit that the story you refer to was a very good one. We are delighted to hear what you say about drinking the cup full of water. In the answer to a critic's letter in a preceding issue the writer stated that he had seen a man stand on his hands, feet in the air, and apparently, at least, drink a glass of beer. You will notice that we are publishing the names of our artists, so you will be able to criticize them after this, very voluminously and to the point. We will always be glad to read any story you choose to submit to us. Put everything on one side of the paper.—EDITOR.)

THE QUESTION OF A TRUE PLANE

Editor, AMAZING STORIES:

This is the second AMAZING STORIES Magazine that I have read. Allow me to congratulate you on the excellent way your magazine is printed. I have been puzzled by many things that your magazine has explained in a very uncomplicated way. In J. Harold Click's "The Dimension Segregator" I noticed something that to me seems untrue.

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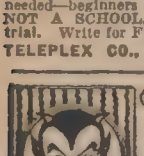

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Thorndyke is explaining the screen that Phil has made out of a "dense alloy." Thorndyke goes on to say that it had been compressed and polished until he believed it was the nearest approach to a true plane surface that he had ever seen. He also says that although it was not strictly a plane, it proved its ability to serve as one. As the next sentence says, "It was about seven feet square," I should think there would not be any doubt as to its not being a plane. Or was he just considering one surface?

Rudolph Kissel,
95 Dean St., Englewood, N. J.

(We are most anxious to explain things which come up in science which are of a complicated nature, so that they can be readily understood. It is a very difficult thing to do, and we are very glad that you express your approval of what our authors do and of our own efforts in this direction. As regards the plane, of course, it is only supposed that one surface of it is a plane; the other surface might be quite irregular, as all the action took place in front.—EDITOR.)

INTERPLANETARY STORIES, NULLIFYING GRAVITY. THE DOG'S SIXTH SENSE. A CHARACTERISTIC LETTER

Editor, AMAZING STORIES:

I have been a reader of AMAZING STORIES since the first issue and have long desired to enter my say in the "Discussions" Department. Up to now, however, I have not followed this desire up. AMAZING STORIES is the one magazine that I take from the newsstand without looking inside of it first. I know I will find interesting reading every time and so far I have never been mistaken. I do not like your cover, however, but that is only from my own viewpoint, as I believe that it actually helps your magazine a lot. There is one story, "Out of the Void," that I wish to criticize. So far as I can see, there is little real science in this story and a lot of incorrect science. For instance, how could this planet Abrui be out between Uranus and Neptune without having been discovered by Astronomers on Earth? Its personal sun alone would be visible, while it must exert quite a bit of influence over Uranus, thus making it impossible for Astronomers to have been able to locate Neptune by mathematical calculation. Also little thought seems to have been given to the dangers faced in a trip through space such as that taken. I take the stand that such a trip would be an almost absolute physical impossibility for two reasons. The first is meteorites, of which it is well known our solar system is full. As their journey was long, they must have passed near to countless thousands of such bodies. I would say that it would be about a thousand to one for them to get through without being hit by one, and no such rocket could stand being hit by a couple of tons or more of iron traveling at the terrific speeds they do. The second is planetoids. They passed right through the center of the whole mass of them and yet they were not hit or attracted to one. Very strange. Well, I read the story anyhow, instead of giving up in disgust as my attitude might suggest. I do hope, however, that in the future your interplanetary stories will be more interesting and more correct than this one. One thing that has interested me greatly is the nullification of gravity. It seems to me that in stories dealing with that the writers forget one thing and that is the revolving of the earth. If a solid body was completely without gravity, I should think that as the earth revolved, it would stay where it was in space. Thus it would appear to travel toward the west at a great speed. Because of the wind created by its progress, it would not travel as fast as the the earth was revolving at that space. Of course it would fly off, or rather appear to fly off into space. What I would like to know is whether it would create much heat going through the atmosphere at that speed? Another form of this nullification of gravity is when something is made that nullifies the gravity of everything above it. In that case I should think that the air above it would be continually rushing off toward the west instead of shooting straight up as some authors would have us believe. Probably quite a wind would be created. One thing that worries me is the fact that light gases such as helium and hydrogen, though apparently out of the attraction of gravity, do not act in this manner. Wait a minute. That's wrong. They rise, not because of lack of gravity, but because they are lighter than air. Thus a balloon, if the former were the case, would keep on going right out into space, but it doesn't. That makes me feel better and

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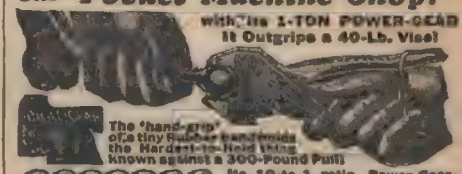

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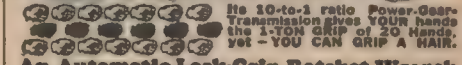

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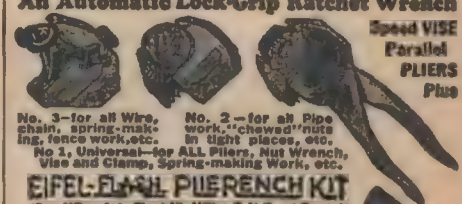

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makes me believe I am right. Please tell me if I am. There is another story besides "Out of the Void" that I wish to put under fire. It is "The Dog's Sixth Sense," a story that appeared in the September issue of AMAZING STORIES. It was a good story, but there was one part that was wrong. It is impossible for a whole eye to be replaced by another one. The reason is that once the optic nerve is severed from the retina, the nerve is completely destroyed. You see the retina is a part of the optic nerve and even to touch either of them destroys their power utterly, never to be returned. I had an argument with my dad about it, but as he is an eye doctor he proved it to me completely. The front part of the eye, however, can be substituted, he says.

Duart Vinson Brown,
Castlewood Country Club, Pleaston, California.

(Your criticisms about the story of "Out of the Void" are certainly quite clever and interesting and we are glad to publish them. We cannot guarantee that every story will be mathematically correct. If this were carried out, our magazine would have to become a very dry one, a sort of resumé of natural science. Hydrogen and helium, as you say in your second statement, rise simply by flotation, just as a cork rises in water. The idea of a whole eye being replaced by another one is simply a sort of prediction of a future possibility. Lots of things are done by surgeons now which a few years ago would have been pronounced rank impossibilities and it is certainly very hard to say when surgery is going to stop. Think of a serious major operation being performed on a person who is in his full senses by the use of local anæsthesia, his face being covered by a cloth, so he would not see what is going on. Yet we know of one patient now, who, while being operated on, without any anæsthetic except the local one, joked with the doctors during the operation.—EDITOR.)

TWO KNOCKS, A BOOST AND A DARE

Editor, AMAZING STORIES:

Two knocks and a boost!! Knock number one. Hitting issue of July, 1929, "Discussions" column, editorial comment on the letter of H. Pedley, London.

"The Democratic party of old times adopted for its slogan the motto that the best governed country is the least governed. But that, unhappily, is no longer the case. Laws and statutes cannot suppress the crime that is so rampant here, where we are over-governed in the opinion of many."

Has it never occurred to you that the appalling multitude of laws might be the cause of the crime, and that a return to the quoted principle might cause a lessening? Sociologists say a law can never be enforced until it enters the *mores* of the people, which fact, for instance, the framers of Prohibition did not take into consideration. Look at the result! However, thank you for the information about the party. I never knew that Philosophic Anarchism had ever wormed that far into our demagogues' heads. Let's hope it increases!!

Knock number two. Aimed at a far past number, for which you are not responsible. Subject, an alleged example of two dimensional space; to wit, a shadow. Now, now! In the first place, a shadow is the absence of light, therefore is a negation, therefore cannot possess any dimension. In the second place, if it could, a shadow is not merely the outline cast on a wall, but includes all the space between the object and the wall, and would therefore be three dimensional.

Having inflicted such grievous wounds as I have, it is only fair to present salve, not soft-soap. The magazine has distinctly improved in the last few issues. Undoubted reason, there is now a rival. AMAZING STORIES has been so long without a rival worthy of the name, that it had just begun to degenerate. Rivalry and (I hope) friendly competition will force both to maintain high standards —"a consummation devoutly to be desired," especially by a subscriber to both.

Robert R. Warner,
Annandale-on-Hudson, New York.

(The writer who is responsible for the quotation is in agreement with you. He has even formulated a theory that it should be easier to repeal a law than to pass one. You seem to have misunderstood him.

A shadow *is* a very pretty illustration or suggestion of the two dimensional world. As far as any rival publication is concerned, there is room for both in a country of over a hundred millions of inhabitants.—EDITOR.)

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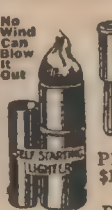

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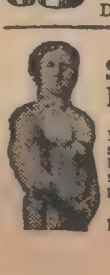

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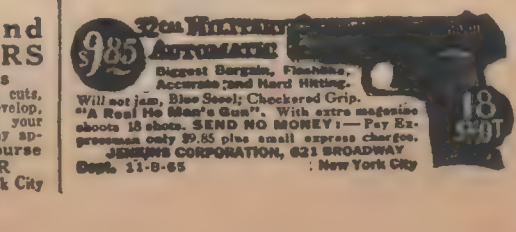

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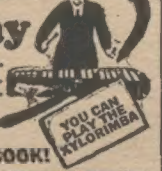

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TRAVELING FASTER THAN LIGHT

Editor, AMAZING STORIES:

I have been a reader of AMAZING STORIES, off and on, for the past two years, but have just recently started reading discussions from readers in the back of the book. As a rule I have found more mistakes in the criticisms of the stories than in the stories themselves. One letter in particular from John H. Penkard, Jr., age 16. Being sixteen myself, I feel more at ease in commenting on his letter. As a whole, the letter is scientifically accurate, with this exception: if a clock could travel at the speed of light, the hands would not turn while it was traveling at this speed, because no time would elapse. I think John's thoughts are a little astray on this subject. If it were possible for a clock to travel at the speed of light and exist, and if it were possible for us to travel along behind it, we would see the hands move at the same speed as ordinarily. But if we were in front of the clock, we couldn't see it at all, for the light waves emitted by it would never reach our eyes since we are traveling fast enough to keep ahead of them. If we could fly off this earth faster than light, we might review the Battle of Waterloo since we would eventually catch up with its light waves. All action would be reversed, however; smoke would re-enter the gun muzzles and dead men would rise from the field. Another writer, Leon Rosenthal by name, stated that if the people in the "Green Prism" story were the size of atoms, then the electrons of the atoms composing a molecule of water would appear the size of tennis balls and would revolve hundreds of feet from the nucleus. But if the atoms are the size of the people, then the electrons could be no more than three feet from the nucleus. Furthermore, the electrons would not be visible, since they compare to the nucleus as a baseball might compare to the earth. If I am wrong in any of my views, I would appreciate being corrected.

Ronald Scribner,
409 10th Ave. M, Seattle, Wash.

(Your letter is quite interesting and in view of the fact that you are so young, you express your views very nicely without the cocksure aspect which affects disastrously so many letters from young readers and correspondents. Your description of what would happen if we could fly off this earth faster than light is quite picturesque. We are highly pleased with your letter. It is a mistake to be too sure of things in this universe.—EDITOR.)

STEREOSCOPIC VISION WITH THREE EYES

Editor, AMAZING STORIES:

Just a note, this being my first offense in writing to an editor of any magazine. I have been an ardent reader of your magazine ever since its first issue and am tremendously interested in any new development of science. A thought has recently occurred to me in connection with the much-disputed fourth dimension: When you look at anything with one eye, the sense of perspective is immediately lost and any scene is reduced to two dimensions, as when one gazes at a painting. When you use two eyes, the third dimension immediately becomes obvious. Now what would happen if it were possible to view a scene with *three* eyes? I am not sufficiently well versed in science to know whether this idea contains any merit at all, or is a mere foolish idea born through ignorance. At least it might possibly give Breuer or Keller or Verrill

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John T. Adams, Mgr., Dept. 1068, 323 S. Peoria St., Chicago, Ill.

or some one of your other contributors a germ of an idea for a story. I detest your covers but have nothing but praise for you after saying that. Wish you would publish more strange scientific discoveries and inventions that have actually occurred, such as your articles on "Televox the Robot," or the Russian experiment on the living dog's head. Hope my suggestion has something to it.

J. N. Hall,
Eastgate Hotel, Chicago, Ill.

(Your idea about the "Third Eye" and how it will affect our visual conception of a scene is not a new one. It is perfectly fair to say that a third eye would greatly improve our perspective, or more properly, our stereoscopic vision. It would be quite interesting if someone would construct a periscope based on the "three eye" principle. An extraordinary theory has even been advanced, based on the location of the pituitary gland in the head, that the gland cavity or cells may represent the place where formerly mankind had a third eye. We are certainly sorry that you do not like our covers, but remember their purpose. They illustrate the story; they are given in color and must be of a type that will attract attention from the passers-by. Don't you even like our more recent covers? It seems to us they possess a good deal more real art than any of our previous covers ever did.—EDITOR.)

ACTION OF A BULLET FIRED FROM A RIFLE ON A MOVING TRAIN

Editor, AMAZING STORIES:

I have a question to ask you. It consists of speed, time and wind resistance chiefly. The known muzzle velocity of a Springfield, model 1917, caliber .30, U. S. army rifle is, theoretically, 2,700 feet per second. Assuming a train going 2,700 feet per second has two men standing 50 feet apart; the man on the rear of a car on the train (50 feet in back of the first man) fired a .30 caliber Army rifle at the man in front of him. Remember, the train is also going 2,700 feet per second. Would you give me a full explanation of this problem? I am a regular reader of "Discussions," and enjoy them intensely. I think they are great. I would appreciate it very much if you would explain this problem. Personally I believe the bullet would not hit him, because the wind resistance would be too great. What do you think?

J. Chas. Johns,
3345 Lambie Place, Detroit, Mich.

(We recently had occasion to refer to George Stevenson's answer to the question of "What would happen to a cow, if it got in front of his locomotive?" This was asked more than a century ago. His answer was that it would be bad for the cow. If all was done as you described, it would be very bad for the man in front of the gun. The speed of the train would be without effect upon the relation of the two men or upon the rifle bullet, except to create a wind, which, of course, would change its velocity. The point is, that the bullet would leave the gun with a velocity of 2,700 feet due to the powder *plus* another 2,700 feet due to the motion of the train. Therefore, it would go at 5,400 feet velocity per second and the wind would not bring it to a stop at once.—EDITOR.)

INTERPLANETARY STORIES A TREAT

Editor, AMAZING STORIES:

I have just received my September issue of the AMAZING STORIES and it certainly had some fine stories in it. My favorite story was "The Red Peril" by Captain S. P. Meek. The best point of the story is showing how defenseless America would be if certain foreign machines invaded our land, and also how a larger supply of disease germs should be stored, especially during a war, when the enemy may use bombs spreading diseases incurable, such as Balinsky made. "Gold Dust and Star Dust" was another fine story. The Fourth Dimension was made very clear. If Corwin had not been lured to discover the gold, wouldn't it have returned the same after the Power Beam had been turned on? Why didn't other articles go into the Fourth Dimension when the Power Beam blew out? "The Dog's Sixth Sense" was an educational story to me, because it gave me something to think about.

Interplanetary stories have always been a rare treat. The best interplanetary story published is "The Skylark of Space." As luck would have it, I read the last instalment and was glad that what went before was also published. Many of the machines are built somewhat like the "Skylark,"

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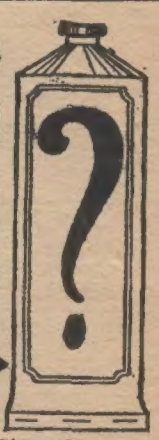
Any Name May Win

No matter how simple you think your suggestion is you cannot afford to neglect sending it at once. Any name may win.



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Win this $1000 cash prize by a few moments' thought. How can you earn this amount of money easier or more quickly? Remember, there is no obligation! The person submitting the winning name will have nothing else to do to win the $1000 and the extra $100, if prompt. In choosing a name bear in mind this dental cream is marvelous for teeth and gums. It is designed to sweeten the breath, beautify the teeth, cleanse cavities and promote teeth and gum health. The only thing necessary to win is to send the name we choose as the neatest and best suited for this dental cream. Only one name will be accepted from each contestant. This unusual offer is only one of a number of offers embraced in our novel distribution plan, whereby those taking part may win any one of twenty-odd prizes, the highest of which is $3500 cash. By participating in our distribution plan the winner of the $1100 cash prize may win an additional $3500, making a total of $4600. Everyone sending a name regardless of whether it wins or not, will be given the same opportunity to win the $3500 or one of the other cash prizes. Get busy with your suggestion at once—do not delay! Neglect may cost you thousands of dollars.

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especially one in AMAZING STORIES QUARTERLY named *"Venus Liberated."* I liked *"Venus Liberated"* greatly, but I can not understand how a planet could be destroyed. If a lot of explosive, such as was used by the expedition, were placed in the center of the earth, do you think it would be possible for such a large planet as this to be destroyed? I thought "Into the Green Prism" was a lovely story, and did not think of certain points as I read it. Some of your readers have disliked it, but all stories have to have some impossibilities in them to make them more interesting. Why should anyone think of changing the cover of AMAZING STORIES? I never would have bought it, if it were not for the cover, because that is what attracted my attention. Those who have called it trashy never have seen or read any of the stories. Since I received my first issue, I have seen AMAZING STORIES improve constantly and the September issue is great. I wish someone would start a Science Club, so I could join.

Charles Stanton,
808 Franklin St., Natchez, Miss.

(If a sufficient quantity of a sufficiently violent explosive was placed in the centre of the earth, our planet could be blown to pieces, and it is a conjecture what would become of the fragments. "Into the Green Prism," which is a very curious story, has won much praise from our readers. Comparatively few have expressed dislike for it. The cover of AMAZING STORIES is done by a good artist and is designed to attract attention just as it attracted yours; it certainly is not trashy and is very carefully studied out.—EDITOR.)

SOME PUZZLES FROM ENGLAND, INCLUDING A "BAG OF NUTS"

Editor, AMAZING STORIES:

First let me tell you I have been a keen reader of your magazine since February, 1928, except for March and April this year, which I unfortunately missed.

The only disappointing issue I have read is the last—the July issue, which has only two short stories coming up to the usual Amazing standard, viz., "The Book of Worlds" and "Danger." Of course, Jules Verne still appeals.

Now for two things that may or may not interest you or your readers.

The effects of gravity often come into discussion in various of your stories, but never in relation to centrifugal force. While gravity pulls inwards, centrifugal force is tending to throw outwards, yet this latter force appears to be completely ignored by most of your writers and apparently by the Scientific World when computing mass and gravity.

To my mind, this means that all our calculations concerning gravity and mass are only relative, and therefore all our astronomical distances and weights. Also that a given body should apparently weigh less as it leaves the Earth's surface until it reaches a point where centrifugal force equals gravity, where it would, in effect, weigh nothing. This point has been referred to as the point where one passes out of the Earth's gravitational field or pull, but this is only correct if it is sufficiently far from the Earth and its atmosphere for it not to be affected by centrifugal force.

Passing this point and remaining stationary, would one be left behind by the Solar system, or carried on with it in a relative position?

That's one bag of nuts. Here's another.

The speed of light is stated to be fixed at about 186,000 miles per second. According to this, a body throwing out light rays and traveling at the speed of light would be invisible from in front, while it is very difficult to conceive its appearance from behind or to one side. Surely it is more reasonable that the light rays will leave at a velocity plus or minus that of its source? Even if this is so, it is difficult to comprehend what a rear view of such a moving body would be like.

I realize that this is almost as bad as asking the well-known childish question, "Where does the light go when it goes out?" but you may be able to lighten my mental darkness.

One word about your excellent magazine.

Please don't put voting coupons, etc., backing on to stories. I keep my copies and don't like to mutilate good tales by cutting out forms.

Owing to the demand, and the above dislike making me delay applying, I was unable to get my copy of "The Vanguard of Venus." Perhaps one of your readers would like to forward me his copy when finished with it in exchange for information or what would you from England.

C. E. Playford,
94 Burnt Ash Road,
Lee. S. E. 12, London, Eng.

(We are glad to receive a good word for Jules Verne. Gravity as a net quantity varies at different points of our earth. It is least at the equator and greatest at the north pole. It would probably be a little less at the south pole on account of its elevation, though the mass of the mountainous region might increase it. It is fair to say that any object in the solar system would never leave it. Light rays are affected by the motion of the source. This fact is the basis of the spectroscopic determination of the velocity of stars moving directly towards or away from us. (Doppler's principle.) In the case of the body you speak of some of the rays of "invisible light" would change places on the spectrum and become visible.—EDITOR.)

November

25 Cents

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